This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a Major, Municipal permit. The discharge results from the operation of a 24 MGD wastewater treatment plant. This permit action consists of updating the proposed effluent limits to reflect the current Virginia WQS (effective January 6, 2011) and updating permit language as appropriate. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9VAC25-260 et seq.

1.	Facility Name and Mailing Address:	H.L. Mooney Advanced Water Reclamation Facility (AWRF) PO Box 2266 Woodbridge, VA 22195	SIC Code :	4952 WWTP
	Facility Location:	1851 Rippon Blvd Woodbridge, VA 22191	County:	Prince William
	Facility Contact Name:	Stephen Bennett	Telephone Number:	(703) 393-2062
	Facility E-mail Address:	Bennett@pwcsa.com		
2.	Permit No.:	VA0025101	Expiration Date of previous permit:	June 30, 2014
	Other VPDES Permits associated with this facility:		VAN010018 – Nutrient General Permit	
	Other Permits associated with this facility:		Air Registration No 71751	
	E2/E3/E4 Status:	Not Applicable		
3.	Owner Name:	Prince William County Service Authority		
	Owner Contact/Title:	Stephen Bennett Deputy Director, Water Reclamation	Telephone Number:	(703) 393-2062
	Owner E-mail Address:	Bennett@pwcsa.com		
4.	Application Complete Date:	December 13, 2013		
	Permit Drafted By:	Alison Thompson	Date Drafted:	July 2, 2014
	Draft Permit Reviewed By:	Doug Frasier	Date Reviewed:	July 9, 2014
	Public Comment Period :	Start Date: August 20, 2014	End Date:	September 19, 2014
5.	Receiving Waters Information:			
	Receiving Stream Name :	Neabsco Creek	Stream Code:	1aNEA
	Drainage Area at Outfall:	Not Applicable	River Mile:	1.57
	Stream Basin:	Potomac	Subbasin:	Potomac
	Section:	6	Stream Class:	II
	Special Standards:	b, y	Waterbody ID:	VAN-A25E
	7Q10 Low Flow:	Tidal (Apr-Oct)	7Q10 High Flow:	Tidal (Nov-Mar)
	1Q10 Low Flow:	Tidal (Apr-Oct)	1Q10 High Flow:	Tidal (Nov-Mar)
	30Q10 Low Flow:	Tidal (Apr-Oct)	30Q10 High Flow:	Tidal (Nov-Mar)
	Harmonic Mean Flow:	Tidal	30Q5 Flow:	Tidal

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

X	State Water Control Law	X	EPA Guidelines
X	Clean Water Act	X	Water Quality Standards
X	VPDES Permit Regulation	X	Other (9VAC25-415; 9VAC25-40)
X	EPA NPDES Regulation		

7. Licensed Operator Requirements: Class I

8. Reliability Class: Class I

9. Permit Characterization:

	Private		Effluent Limited		Possible Interstate Effect
	Federal	X	Water Quality Limited		Compliance Schedule Required
	State	X	Whole Effluent Toxicity Program Required		Interim Limits in Permit
X	POTW	X	Pretreatment Program Required		Interim Limits in Other Document
X	TMDL	X	e-DMR Participant		

10. Wastewater Sources and Treatment Description:

This facility is a publicly owned treatment works with a design flow of 24 MGD. The Certificate to Operate the 24 MGD facility was issued on November 8, 2010. The upgrade to the 24 MGD tier with state-of-the-art nutrient removal was completed as a cost share with DEQ Grant #440-S-08-15.

Treatment consists of screening, grit removal, flow equalization, primary clarification with coagulant feed (ferric chloride), aeration basins, secondary clarification, denitrification filters, UV disinfection, and cascade post aeration before discharge to the tidal portion of Neabsco Creek at Outfall 001. See Attachment 1 for a facility schematic/diagram.

Seven storm water outfalls for the HL Mooney AWRF were permitted under VPDES General Stormwater Industrial Permit VAR051424. A site review was conducted by DEQ staff on February 28, 2014 and by letter dated April 11, 2014 (Attachment 2) DEQ approved the no-exposure certification to the facility and the VPDES General Permit for Storm Water Discharges Associated with Industrial Activity was terminated on May 11, 2014.

TABLE 1 – Outfall Descriptions

Outfall Number	Discharge Sources	Treatment	Design Flow(s)	Outfall Latitude and Longitude
001	Domestic and/or Commercial Wastewater	See Item 10 above.	24 MGD	38° 36' 39" 77° 16' 13"
Stormwater Outfalls 001-007	Non-contaminated stormwater	None	Not Applicable	Various
See Attachment 3 for (DEQ #194D – Quantico) topographic map.				

11. Sludge Treatment and Disposal Methods:

Bar screenings and grit are hauled by truck to an approved landfill. Currently, the facility incinerates the majority of their sewage sludge. Gravity thickened sludge is pumped to sludge holding tanks prior to dewatering. The sludge is chemically conditioned with polymer before dewatering by high solids centrifuges. Dewatered sludge is incinerated in a Fluidized Bed Incinerator (FBI).

The inert ash is hauled by truck to the landfill. When the incinerator is out of service for maintenance, sludge has been hauled to multiple landfills for disposal.

According to the application, the facility incinerates 5,488 dry metric tons of sewage sludge annually. The application identified four landfills that received sewage sludge (234.08 dry metric tons) from this facility: Atlantic Waste Disposal-Sussex County, Waste Management of Virginia Inc – Charles City County, King George Landfill and Recycling Center, and Middle Peninsula Landfill and Recycling Facility.

With this reissuance, the facility has requested that permit conditions and limitations be included for the land application of lime-stabilized sludge as well as conditions allowing the sludge to be composted. The regulations that establish the permit limitations and conditions specific to the land application of the sewage sludge are discussed in Fact Sheet Section 20.d.

12. Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge

TABLE 2	
VA0024678	Dale Service Corporation Section 8 Outfall 001. River mile 9.15 on Neabsco Creek.
VA0024724	Dale Service Corporation Section 1 Outfall 001. River mile 0.04 on UT to Neabsco Creek.
1aNEA002.89	DEQ Ambient Water Quality Monitoring Station at Route 1. River mile 2.89 on Neabsco Creek.
VA0025101	PWCSA HL Mooney AWRF Outfall 001. River mile 1.57 on Neabsco Creek.
1aNEA000.40	DEQ Ambient Water Quality Monitoring Station in Neabsco Bay. River near marker 3/4.
1aNEA000.57	DEQ Ambient Water Quality Monitoring Station midway into Neabsco Bay near the railroad Bridge.
There are no known drinking water intakes in the vicinity of the outfall.	

13. Material Storage:

TABLE 3 - Material Storage	
Materials Description	Maximum Volume Stored
Ferric Chloride	48,000 gallons (4 – 12,000 gallon tanks)
Pebble Lime	180 tons (1 – silo)
Sodium Hydroxide	6,000 gallons (1 – 6,000 gallon tank)
Methanol	25,000 gallons 1 – 25,000 gallon tank)
Sodium Hypochlorite	24,000 gallons (2 – 12,000 gallon tanks)
Diesel Fuel	500 gallons, 20,000 gallons, 6,000 gallons (3 tanks)
Unleaded Gasoline	2,000 gallons (1 tank)
Kerosene	275 gallons (1 tank)
Lubricants	Numerous 55-gallon drums
Low Sulfur Diesel Fuel	14,220 gallons (2 – 7,000 gallon tanks and 1-220 gallon tank)

14. Site Inspection:

Performed by DEQ-Compliance on September 21, 2012 (Attachment 4).

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15. Receiving Stream Water Quality and Water Quality Standards:

a. Ambient Water Quality Data

This facility discharges into a segment of tidal Neabsco Creek that is not currently monitored by DEQ, but is listed with a water quality impairment. The following is the water quality summary for the receiving stream segment of tidal Neabsco Creek, as taken from the 2012 Integrated Report:

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. A PCB TMDL for the tidal Potomac River watershed has been completed and approved.

The aquatic life use is fully supporting. A TMDL has been completed for the Chesapeake Bay watershed. This downstream TMDL completed by EPA addresses the poor water quality in the Chesapeake Bay, and takes into account the entire Bay watershed including upstream tidal tributaries such as Neabsco Creek. The submerged aquatic vegetation data is assessed as fully supporting the aquatic life use. For the open water aquatic life subuse; the thirty day mean is acceptable, however, the seven day mean and instantaneous levels have not been assessed.

The recreation and wildlife uses were not assessed.

There is a downstream DEQ ambient monitoring station, 1aNEA000.57, located in Neabsco Bay at the railroad bridge, approximately 1 mile downstream of Outfall 001. The following is the water quality summary for Neabsco Bay, as taken from the 2012 Integrated Report:

DEQ monitoring stations located in Neabsco Bay:

- *Ambient water quality monitoring station 1aNEA000.40, near Marker 3/4*
- *Fish tissue, water quality, and continuous monitoring station 1aNEA000.57, at railroad bridge*

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory and sufficient excursions above the fish tissue value (TV) for PCBs in fish tissue. Additionally, an excursion above the fish tissue value (TV) of 300 parts per billion (ppb) for mercury (Hg) in fish tissue was recorded in one species of fish (1 total samples) collected in 2008 at monitoring station 1aNEA000.57 (bluegill sunfish) is noted by an observed effect. A PCB TMDL for the tidal Potomac River watershed has been completed and approved.

E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use.

The aquatic life use is fully supporting. A TMDL has been completed for the Chesapeake Bay watershed. This downstream TMDL completed by EPA addresses the poor water quality in the Chesapeake Bay, and takes into account the entire Bay watershed including upstream tidal tributaries such as Neabsco Creek. The submerged aquatic vegetation data is assessed as fully supporting the aquatic life use. For the open water aquatic life subuse; the thirty day mean is acceptable, however, the seven day mean and instantaneous levels have not been assessed.

The wildlife use is considered fully supporting.

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b. 303(d) Listed Stream Segments and Total Maximum Daily Loads (TMDLs)

TABLE 4- 303(d) Impairment and TMDL information for the receiving stream segment						
Waterbody Name	**Impaired Use**	**Cause**	**TMDL completed**	**WLA**	**Basis for WLA**	**TMDL Schedule**
Impairment Information in the 2012 Integrated Report						
Neabsco Creek	Fish Consumption	PCBs	Tidal Potomac River PCB 10/31/2007	2.12 grams/year PCB	0.064 ng/L PCB --- 24 MGD	NA

TABLE 5 - Information on Downstream 303(d) Impairments and TMDLs							
Waterbody Name	**Impaired Use**	**Cause**	**Distance From Outfall**	**TMDL completed**	**WLA**	**Basis for WLA**	**TMDL Schedule**
Impairment Information in the 2012 Integrated Report							
Neabsco Bay	Recreation	*E. coli*	0.25 miles	No	---	---	2016
Chesapeake Bay	Aquatic Life	Total Nitrogen	---	Chesapeake Bay TMDL 12/29/2010	219,280 lbs/yr TN	Edge of Stream (EOS) Loads	NA
		Total Phosphorus			13,157 lbs/yr TP		
		Total Suspended Solids			2,192,803.2 lbs/yr TSS		

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the 2012 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment. EPA issued the Bay TMDL on December 29, 2010. It was based, in part, on the Watershed Implementation Plans developed by the Bay watershed states and the District of Columbia.

The Chesapeake Bay TMDL addresses all segments of the Bay and its tidal tributaries that are on the impaired waters list. As with all TMDLs, a maximum aggregate watershed pollutant loading necessary to achieve the Chesapeake Bay's water quality standards has been identified. This aggregate watershed loading is divided among the Bay states and their major tributary basins, as well as by major source categories [wastewater, urban storm water, onsite/septic agriculture, air deposition]. Fact Sheet Section 17.e provides additional information on specific nutrient limitations for this facility to implement the provisions of the Chesapeake Bay TMDL.

The planning statement is found in Attachment 5.

c. Receiving Stream Water Quality Criteria

Part IX of 9VAC25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream Neabsco Creek is located within Section 6 of the Potomac River Basin, and classified as a Class II water.

Class II tidal waters in the Chesapeake Bay and it tidal tributaries must meet dissolved oxygen concentrations as specified in 9VAC25-260-185 and maintain a pH of 6.0-9.0 standard units as specified in 9VAC25-260-50. In the Northern Virginia area, Class II waters must meet the Migratory Fish Spawning and Nursery Designated Use from February 1 through May 31. For the remainder of the year, these tidal waters must meet the Open Water use. The applicable dissolved oxygen concentrations are presented Attachment 6.

The Freshwater Water Quality/Wasteload Allocation Analysis (Attachment 7) details other water quality criteria applicable to the receiving stream. Since there is tidal influence at the outfall, dilution ratios will be used in lieu of the steady state complete mix equation (Attachment 8, page 9).

Some Water Quality Criteria are dependent on the temperature and pH and Total Hardness of the stream and final effluent. The stream and final effluent values used as part of Attachment 7 are as follows:

pH and Temperature for Ammonia Criteria:
The fresh water, aquatic life Water Quality Criteria for Ammonia are dependent on the instream temperature and pH. Since the effluent may have an impact on the instream values, the temperature and pH values of the effluent must also be considered when determining the ammonia criteria for the receiving stream. The 90th percentile temperature and pH values are used because they best represent the critical conditions of the receiving stream.

For the 2003-2008 permit cycle, the pH and temperature data from DEQ's ambient monitoring station 1ANEA000.57 was evaluated and consequently used to develop the ammonia criteria and subsequent permit limits. Staff believed that the data contained a sampling bias since most ambient samples were collected between 10 a.m. and 2 p.m., the time period of the highest photosynthetic activity in a shallow, open embayment such as the mouth Neabsco Creek. Because of the potential sampling bias, staff used the 50th percentile pH and temperature values for the calculation of the ammonia as nitrogen criteria and the subsequent limits. Through a permit special condition in the 2003 permit, the permittee conducted pH and temperature monitoring in Neabsco Creek to determine if there was sampling bias and if the pH assumptions were correct.

The permittee submitted a final instream monitoring report in December 2005. A copy of the report was submitted with the application and is also found in Attachment 8. The study provided a better snapshot of the pH conditions in Neabsco Creek during each of the seasons than the limited data pool available during the 2003 reissuance. The 90th percentile pH and temperature from the 2005 study were used for the November-January and February-March ammonia criteria with the 2009-2014 reissuance. The values used for each of the seasonal ammonia criteria are summarized in Table 6a:

TABLE 6a – Acute and Chronic Ammonia Criteria				
Season	90th percentile pH (S.U.)	90th percentile temperature (°C)	Acute Ammonia as N (mg/L)	Chronic Ammonia as N (mg/L)
November 1 – February 14 *	8.0 (7.6)**	11.6 (6.7)	8.4 (17.0)	2.9 (6.4)
February 15 – March 31	8.42 (7.8)	10.4 (8.1)	3.7 (12.1)	1.2 (3.2)

* Early Life Stages Absent - Special Standard y
** Values in parentheses are the 50th values and criteria used in the 2003 reissuance

For the April to October ammonia criteria, the permittee proposed to derive a 30-day average criteria using paired pH and temperature data from the 2005 study. DEQ also had a robust data set for the embayment from 2006 for the April to October time period, so the permittee derived 30-day average ammonia criteria using both paired data sets. DEQ accepted this approach and the documentation for the derivation of the criteria used for the current April-October weekly average is found in Attachment 9. Presented in the table below are the 90th percentile pH and temperature derivations when you look at the pH and temperature separately rather than as paired data. These numbers are for illustrative purposes only.

TABLE 6b – Acute and Chronic Ammonia Criteria				
Season	90th percentile pH (S.U.)	90th percentile temperature (°C)	Acute Ammonia as N (mg/L)	Chronic Ammonia as N (mg/L)
April 1–October 31 (PES months)	8.9 (8.2)**	30.11 (24.2)	3.7 (5.72)	0.69 (0.96)

** Values in parentheses are the 50th values and criteria used in the 2003 reissuance

Since the pH and temperature values used to establish the ammonia criteria is data from Neabsco Creek downstream of the discharge, staff reviewed the DEQ ambient field data for monitoring station 1aNEA000.57 to determine if the data used to establish the criteria is still appropriate. Staff reviewed available data from January 2010 through March 2014. A copy of the data is found in Attachment 7.

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TABLE 6c – pH and Temperature Comparison				
Season	90th percentile pH (S.U.) used to establish criteria	90th percentile pH (S.U.) DEQ monitoring data	90th percentile temperature (°C) used to establish criteria	90th percentile temperature (°C) DEQ monitoring data
November 1 – February 14 *	8.0	7.95	11.6	9.7
February 15 – March 31	8.42	8.248	10.4	9.9
April 1–October 31 (PES months)	8.9	8.54	30.11	28.0

* Early Life Stages Absent - Special Standard y

Based on the above comparison in Table 6c, it is staff's best professional judgment that the values used to establish the criteria are still appropriate and shall be used to establish the criteria and subsequent wasteload allocations for this reissuance.

Total Hardness for Hardness-Dependent Metals Criteria:
The Water Quality Criteria for some metals are dependent on the receiving stream's total hardness (expressed as mg/L calcium carbonate) as well as the total hardness of the final effluent.

The average total hardness for the VAN-A25E watershed (Neabsco Creek, Occoquan River) is 105.9 mg/L. This value was derived utilizing all the available DEQ ambient data in the watershed from January 1990 through February 2011.

The effluent data for total hardness was provided as part of the application. There were three data points: 126 mg/L on July 11, 2012, 113 mg/L on December 13, 2011, and 125 mg/L on December 5, 2012. The average total hardness for this facility is 121 mg/L.

The hardness-dependent metals criteria in Attachment 7 are based on these three recent values.

Bacteria Criteria:
The Virginia Water Quality Standards at 9VAC25-260-170A state that the following criteria shall apply to protect primary recreational uses in surface waters:

E. coli bacteria per 100 ml of water shall not exceed a monthly geometric mean of the following:

	Geometric Mean[1]
Freshwater *E. coli* (N/100 ml)	126

[1]For a minimum of four weekly samples [taken during any calendar month].

d. Receiving Stream Special Standards

The State Water Control Board's Water Quality Standards, River Basin Section Tables (9VAC25-260-360, 370 and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving stream, Neabsco Creek, is located within Section 6 of the Potomac Basin. This section has been designated with special standards of b and y.

Special Standard "b" (Potomac Embayment Standards) established effluent standards for all sewage plants discharging into Potomac River embayments and for expansions of existing plants discharging into non-tidal tributaries of these embayments. 9VAC25-415, Policy for the Potomac Embayments controls point source discharges of conventional pollutants into the Virginia embayment waters of the Potomac River, and their tributaries, from the fall line at Chain Bridge in Arlington County to the Route 301 Bridge in King George County. The regulation sets effluent limits for BOD_5, total suspended solids, phosphorus, and ammonia, to protect the water quality of these high profile waterbodies.

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Special Standard "y" is the chronic ammonia criterion for tidal freshwater Potomac River and tributaries that enter the tidal freshwater Potomac River from Cockpit Point (below Occoquan Bay) to the fall line at Chain Bridge. During November 1 through February 14 of each year the thirty-day average concentration of total ammonia nitrogen (in mg N/L) shall not exceed, more than once every three years on the average the following chronic ammonia criterion:

$$\left(\frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}} \right) \times 1.45(10^{0.028(25-MAX)})$$

MAX = temperature in °C or 7, whichever is greater.

The default design flow for calculating steady state waste load allocations for this chronic ammonia criterion is the 30Q10, unless statistically valid methods are employed which demonstrate compliance with the duration and return frequency of this water quality criterion.

e. Threatened or Endangered Species
The Virginia DGIF Fish and Wildlife Information System Database was searched on January 8, 2014 for records to determine if there are threatened or endangered species in the vicinity of the discharge. No threatened or endangered species were identified within a 2 mile radius of the discharge. The limits proposed in this draft permit are protective of the Virginia Water Quality Standards and protect the threatened and endangered species found near the discharge. The printout from the database can be found in Attachment 10.

The stream that the facility discharges to is within a reach identified as having an Anadromous Fish Use. It is staff's best professional judgment that the proposed limits are protective of this use.

f. Maryland Water Quality Standards
HL Mooney Water Reclamation Facility discharges to Neabsco Creek, which is a tributary to the Potomac River. The discharge is approximately 0.5 miles from the Maryland State line. Staff reviewed the State of Maryland's Water Quality Standards and believes that the effluent limitations established in this permit will comply with Maryland's water quality standards at the point Neabsco Creek enters the Potomac River.

16. Antidegradation (9VAC25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The receiving stream has been classified as Tier 1 based on the following: the receiving waters have been designated as impaired, and the effluent limits are set to meet the water quality standards. Permit limits proposed have been established by determining wasteload allocations which will result in attaining and/or maintaining all water quality criteria which apply to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development:

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points is equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLA) are calculated. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. Effluent limitations are then calculated on the most limiting WLA, the required sampling frequency, and statistical characteristics of the effluent data.

a. Effluent Screening:
Effluent data obtained from the permit application and Discharge Monitoring Reports (DMRs) from January 2013 through March 2014 has been reviewed and determined to be suitable for evaluation.

The following pollutants require a wasteload allocation analysis based on data provided as part of the permit application: Copper, Molybdenum, Nickel, Mercury, Zinc, and Vanadium. With regard to the Outfall 001 discharge, ammonia as N is also likely present since this is a wastewater treatment facility treating sewage.

b. Mixing Zones and Wasteload Allocations (WLAs):
Neabsco Creek at the point of discharge is a tidal estuary and has tidal influence. For tidal estuaries, chronic wasteload allocations should be based on site specific data of waste dispersion or dilution. Where dispersion/dilution data is not available, a dilution ratio of 50:1 for chronic toxicity is usually recommended as default. Acute wasteload allocations are established by multiplying the acute water quality criteria by 2. The 2X factor is derived from the fact that the acute criteria are defined as one half of the final acute value (FAV) for a specific toxic pollutant. The term "final acute value" is defined as a cumulative probability of 0.05 for the acute toxicity values for all genera for which acceptable acute tests have been conducted with toxicants (Guidance Memo 00-2011).

Staff believes that the guidance for chronic dilution of 50:1 for tidal waters is not applicable to this waterbody because the discharge is located near the fall line where the tidal influence is the smallest, the embayment is very shallow, and has an abundance of macrophytes. Staff's position is that unless dilution is demonstrated through a site-specific study, no dilution is recognized and chronic water quality criteria will be applied at end-of-pipe. PWCSA did conduct a site specific dilution study and near field-mixing analysis in 1997 for Neabsco Creek (Attachment 11). The documentation provided are used as the basis for the chronic toxicity instream waste concentrations summarized below:

Season	24 MGD	
	IWC	Dilution Factor
November–March	40.53%	2.47:1
April–October (except ammonia)	41.84%	2.39:1

The above values are used to derive WLAs for all chronic criteria except ammonia. Because ammonia decays, the recent PWCSA pH and temperature study in Attachment 12 addressed the decay of ammonia and determined IWCs just for chronic ammonia criteria. In the 2003 reissuance decay was not considered because the 50th percentile temperatures were less than 10°C. Staff's opinion was that nitrification in ambient waters is negligible when temperature is < 10°C.

The instream monitoring found that the winter temperatures were higher than the 50th percentile values used during the 2003 reissuance, so staff allowed decay for the November to March period. The following dilution factors for ammonia are used for limit development with this reissuance:

Season	24 MGD	
	IWC	Dilution Factor
November - January	26.63%	3.76:1
February -March	27.67%	3.61:1
April–October	20.18%	4.96:1

c. Effluent Limitations Toxic Pollutants, Outfall 001 –

9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9VAC25-31-230.D requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N:

Ammonia as N (April through October)
The following table summarizes the ammonia limits evaluated during this reissuance:

Source of the Monthly Average Limit	Monthly Average Limit – 24 MGD
Policy for the Potomac River Embayments (PPRE)	1.0 mg/L
Water Quality Criteria	3.42 mg/L

Since the PPRE is more stringent than the current Water Quality Criteria, the April through October monthly average limit shall be 1.0 mg/L. The weekly average limit will be 4.1 mg/L at 24 MGD, and it is based on the WQC established with the 30-day average criteria using paired pH and temperature data, the mixing zone study, and wasteload allocation described in 15.c. and 17.b.

Ammonia as N (November 1st through January 31st)
Attachment 7 contains the derivation of the Early Life Stages Absent ammonia criteria. Special Standard y lists the Early Life Stages Absent from November 1st through February 14th. Since it is not practical to have limits for half a calendar month, staff has set the limits for November through January. This is a conservative choice to assure protection against chronic toxicity for any consecutive 30-day period during February through March. The limits for November 1st through January 31st are:

Ammonia as N November-January	24 MGD
Monthly Average	No Limit
Weekly Average	No Limit

Ammonia as N (February through March)
There are slight differences in the calculation of the ammonia limits for the February 1st through March 31st time frame between the 2009 and 2014 reissuances. The limits calculated are:

Ammonia as N February-March	2009 reissuance	2014 reissuance calculated	2014 reissuance final
Monthly Average	4.6 mg/L	4.5 mg/L	4.6 mg/L
Weekly Average	5.5 mg/L	5.4 mg/L	5.5 mg/L

The difference is due to the methodology used to calculate the WLAs. The 2014 WLAs in the Freshwater Water Quality/Wasteload Allocation Analysis Spreadsheet (Attachment 7) are based on the calculation of the 90th percentile pH and temperature and then deriving the WLAs. The 2009 values are based on the WQC established with the 30-day average criteria using paired pH and temperature data, the mixing zone study, and wasteload allocation described in 15.c. and 17.b. The 2009 methodology from Greeley and Hansen provides a better picture of actual condition; therefore, it is proposed to carry forward the 2009 limitations with this reissuance.

Also, the Environmental Protection Agency (EPA) finalized new, more stringent ammonia criteria in August 2013; possibly resulting in significant reductions in ammonia effluent in NPDES Discharge Permits. It is staff's best professional judgment that incorporation of these criteria into the Virginia Water Quality Standards is forthcoming. This and many other facilities may be required to comply with these new criteria during their next respective permit terms, so any minor changes in the Ammonia as N effluent limitations would be counterproductive to the new EPA ammonia criteria.

All of the limit derivations for Ammonia as N can be found in Attachment 14.

2) Metals:

Copper, Mercury, Nickel, Molybdenum, Vanadium, and Zinc all had detectable concentrations in at least one of the three scans done as part of the reissuance application package. None of the values were close to the Site Specific Target Values calculated for the facility, so no limit evaluations are needed since there is no reasonable potential to exceed the WQS.

d. Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants

No changes to dissolved oxygen (D.O.), *E. coli,* and pH limitations are proposed.

Dissolved oxygen (D.O.) has a daily minimum concentration of 6.0 mg/L and is based on original modeling conducted (Attachment 13) and is set to meet the water quality criteria for D.O. in the receiving stream.

pH limitations are set at the water quality criteria.

E. coli limitations are in accordance with the Water Quality Standards 9VAC25-260-170.

e. Effluent Limitations Policy for the Potomac River Embayments (PPRE), Outfall 001

The PPRE included monthly average effluent limits that apply to all sewage treatment plants:

Parameter	Monthly Average (mg/L)
$cBOD_5$	5
Total Suspended Solids	6.0
Total Phosphorus	0.18
NH_3 (Apr 1 – Oct 31)	1.0

The PPRE states that the "above limitations shall not replace or exclude the discharge from meeting the requirements of the State's Water Quality Standards (9VAC25-260-10 *et seq.*)." These limits are protective of the criteria for dissolved oxygen.

f. Effluent Annual Average Limitations and Monitoring, Outfall 001 – Nutrients

VPDES Regulation 9VAC25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay.

As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries. Only concentration limits are now found in the individual VPDES permit when the facility installs nutrient removal technology. The basis for the concentration limits is 9VAC25-40 - *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed* which requires new or expanding discharges with design flows of ≥0.04 MGD to treat for TN and TP to either BNR (Biological Nutrient Removal) levels (TN = 8 mg/L; TP = 1.0 mg/L) or SOA (State of the Art) levels (TN = 3.0 mg/L and TP = 0.3 mg/L).

This facility has also obtained coverage under 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit as well as compliance schedules and other permit requirements, shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit. This facility has coverage under this General Permit; the permit number is VAN010018. Total Nitrogen Annual Loads and Total Phosphorus Annual Loads from this facility are found in 9VAC25-720 – *Water Quality Management Plan Regulation* which sets forth TN and TP maximum wasteload allocations for facilities designated as significant discharges, i.e., those with design flows of ≥0.5 MGD above the fall line and >0.1 MGD below the fall line.

Monitoring for Nitrates + Nitrites, Total Kjeldahl Nitrogen, and Total Nitrogen are included in this permit. The monitoring is needed to protect the Water Quality Standards of the Chesapeake Bay. Monitoring frequencies are set at the frequencies set forth in 9VAC25-820. This facility was first upgraded to Biological Nutrient Removal (BNR) technology with WQIF grant

#440-S-98-03. This facility used Water Quality Improvement Funds to upgrade the facility to SOA treatment at 24 MGD. As such, an annual average effluent limitation of 3.0 mg/L for Total Nitrogen and monthly and Year-To-Date calculations are included in this individual permit at the 24 MGD flow tier. The facility's annual Total Nitrogen allocation set forth in 9VAC25-720 – *Water Quality Management Plan Regulation* is also based on 3.0 mg/L at 24 MGD.

The annual average limitation for Total Phosphorus (TP) was not included in this individual permit. The monthly average TP limit of 0.18 mg/L is based upon the Policy for the Potomac River Embayments, which the general permit does not supersede. It is staff's best professional judgment that this monthly average limit is more stringent than the annual average at the same concentration per the WLA found in 9VAC25-720-120-C.

f. Effluent Limitations and Monitoring Summary:

The effluent limitations are presented in the following table. Limits were established for $cBOD_5$, Total Suspended Solids, Ammonia as Nitrogen, pH, Dissolved Oxygen, Total Phosphorus, Total Nitrogen, and *E. coli*. Monitoring is included for Flow, TKN, Nitrate+Nitrite, and Whole Effluent Toxicity.

The mass loading (kg/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and a conversion factor of 3.785.

The mass loading (lb/d) for Total Phosphorus monthly and weekly averages were calculated by multiplying the concentration values (mg/L), with the flow values (in MGD) and a conversion factor of 8.345.

An ammonia loading limit for the summer months is included in the permit because the basis for this limit is PPRE and not the toxic water quality criteria.

The weekly average concentrations for TSS, Total Phosphorus, and $cBOD_5$ were calculated by using the monthly average concentration and multiplying by a 1.5 multiplier.

While the facility received the Certificate to Operate for the 24 MGD tier in November 2010, the monthly average flow at the facility has been approximately 13 MGD from August 2012 through August 2013. Since the flows are still well under the design flow, DEQ granted the reduced monitoring frequencies cBOD, TSS, and *E. coli* at the 24 MGD flow tier until the monthly average flow reaches 16 MGD for three consecutive months. At that time, the frequency of monitoring for these parameters shall be daily.

The VPDES Permit Regulation at 9VAC25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal for cBOD and TSS (or 65% for equivalent to secondary). The limits in this permit are water-quality-based effluent limits and result in greater than 85% removal.

18. Antibacksliding:
All limits in this permit are at least as stringent as those previously established. Backsliding does not apply to this reissuance.

19.a. Effluent Limitations/Monitoring Requirements:

Design flow is 24 MGD.
Effective Dates: During the period beginning with effective date of the permit and lasting until the expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS Monthly Average	Weekly Average	Minimum	Maximum	MONITORING REQUIREMENTS Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	3	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$cBOD_5$ [c]	4	5 mg/L 400 kg/day	8 mg/L 700 kg/day	NA	NA	1/D[c]	24H-C
Total Suspended Solids (TSS) [c]	4	6.0 mg/L 540 kg/day	9.0 mg/L 820 kg/day	NA	NA	1/D[c]	24H-C
Dissolved Oxygen	3,5	NA	NA	6.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	3	NL mg/L	NA	NA	NA	3D/W	24H-C
Ammonia, as N (Nov-Jan)	3,5	NL mg/L	NL mg/L	NA	NA	1/D	24H-C
Ammonia, as N (Feb-Mar)	3,5	4.6 mg/L	5.5 mg/L	NA	NA	1/D	24H-C
Ammonia, as N (Apr-Oct)	3,4,5	1.0 mg/L 91 kg/day	4.1 mg/L 370 kg/day	NA	NA	1/D	24H-C
E. coli (Geometric Mean) [c,d]	3	126 n/100mls	NA	NA	NA	1/D[c]	Grab
Nitrate+Nitrite, as N	3, 6	NL mg/L	NA	NA	NA	3D/W	24H-C
Total Nitrogen [a]	3, 6	NL mg/L	NA	NA	NA	3D/W	Calculated
Total Nitrogen – Year to Date [b]	3, 6	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen - Calendar Year [b]	3, 6	3.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus	4	0.18 mg/L 36 lb/day	0.27 mg/L 54 lb/day	NA	NA	1/D	24H-C
Chronic Toxicity – *C. dubia* (TU_c)		NA	NA	NA	NL	1/YR	24H-C
Chronic Toxicity – *P. promelas* (TU_c)		NA	NA	NA	NL	1/YR	24H-C

The basis for the limitations codes are:
1. Federal Effluent Requirements
2. Best Professional Judgment
3. Water Quality Standards
4. Potomac Embayment Standards
5. Stream Model- Attachment 13
6. 9VAC25-40 (Nutrient Regulation)

MGD = Million gallons per day.
NA = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

1/D = Once every day.
1/M = Once every month.
3D/W = Three days a week.
1/YR = Once every calendar year.

24H-C = A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 24-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of twenty-four (24) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum twenty-four (24) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by ≥10% or more during the monitored discharge.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

a. Total Nitrogen = Sum of TKN plus Nitrate+Nitrite

b. See Section 20.a. for the calculation of the Nutrient Calculations.

c. See Section 21.n. The facility shall monitor at reduced frequencies (3D/W – Three days a week for cBOD and TSS, and 5D/W – Five days a week for *E. coli)* until the monthly average flow reaches 16 MGD for three (3) consecutive months at the 24 MGD flow tier, then the permittee shall begin daily (1/D) monitoring for $cBOD_5$, TSS, and *E. coli*.

d. Samples shall be collected between 6:30 a.m. and 4:00 p.m.

19.b. Effluent Limitations/Monitoring Requirements:

Stormwater Outfalls 001-007
Effective Dates: During the period beginning with effective date of the permit and lasting until the expiration date.

The facility is authorized to discharge non-contaminated stormwater through Stormwater Outfalls 001-007.
There shall be no discharge of floating solids or visible foam in other than trace amounts.
There shall be no discharge of process wastewater through these outfalls.

20. Other Permit Requirements:

a. Part I.B. of the permit contains quantification levels and compliance reporting instructions.

9VAC25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9VAC25-31-220.D requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen and Phosphorus parameters shall be in accordance with the calculations set forth in 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9VAC25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

b. Permit Section Part I.C., details the requirements of a Pretreatment Program

The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and 9VAC25-31-220.D requires all discharges to protect water quality. The VPDES Permit Regulation at 9VAC25-31-730 through 900., and the Federal Pretreatment Regulation at 40 CFR Part 403 requires POTWs with a design flow of >5.0 MGD and receiving from Industrial Users (IUs) pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards to develop a pretreatment program.

This treatment works is a POTW with a design capacity of 24 MGD. Prince William County Service Authority has been working with DEQ Pretreatment Staff to implement an approved pretreatment program. The pretreatment program conditions in the proposed permit reissuance shall include: implementation of the approved pretreatment program that complies with the Clean Water Act, State Water Control Law, state regulations, and the approved program.

c. Permit Section Part I.D., details the requirements for Whole Effluent Toxicity (WET) Program.

The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and 9VAC25-31-220.I, requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A WET Program is imposed for municipal facilities with a design rate >1.0 MGD, with an approved pretreatment program or required to develop a pretreatment program, or those determined by the Board based on effluent variability, compliance history, IWC, and receiving stream characteristics. This section of the permit sets forth the requirements for monitoring for Whole Effluent Toxicity.

The statistical evaluation in Attachment 14 demonstrate that there is no limit necessary for Whole Effluent Toxicity.

Attachment 15 contains a summary of the past testing results for this facility.

d. Permit Section Part III. details requirements of the Sewage Sludge (Biosolids) Management Plan, Sludge Monitoring and Additional Reporting Requirements.

With this reissuance, the permittee requested that the special conditions for land application through a contractor be included in the permit. These conditions are applicable only when the biosolids are land applied.

1. Regulations:

The VPDES Permit Regulation 9VAC25-31-420 through 729 establishes the standards for the use or disposal of biosolids; specifically land application and surface disposal, promulgated under 40 CFR Part 503. Standards consist of general requirements, pollutant limits, management practices and operational standards. Furthermore, VPA Regulation 9VAC25-32-303 through 685 sets forth the requirements pertaining to Class A and Class B biosolids. Since the facility has the option of producing either Class A or Class B material, requirements for both were included with this reissuance. The permit sets forth the parameters to be monitored, monitoring frequencies, sampling types, the Biosolids Management Plan and reporting requirements.

Sewage sludge is the solid, semisolid, or liquid materials removed during the treatment of domestic sewage in a treatment facility. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced wastewater treatment, scum, domestic septage, portable toilet pumping. These regulations require that the sewage sludge undergo established treatment to meet the pathogen control levels, established treatment and management practices to meet the vector attraction reduction, and contain concentrations of regulated metals below established limits. The properly treated and processed sewage sludge becomes "biosolids" which can be safely recycled and applied as fertilizer to improve and maintain productive soils and stimulate plant growth.

2. Evaluations:

Sludge Classification:
The HL Mooney AWRF is considered as Class I sludge management facility. The permit regulation (9VAC25-31-500) defines a Class I sludge management facility as any POTW which is required to have an approved pretreatment program defined under Part VII of the VPDES Permit Regulation (9VAC25-31-730 to 900) and/or any treatment works treating domestic sewage sludge that has been classified as a Class I facility by the Board because of the potential for its sewage sludge use or disposal practice to adversely affect public health and the environment.

Sludge Pollutant Concentration:
The HL Mooney AWRF conducted a pilot study utilizing the Schwing Bioset ™ Lime Stabilization Technology to determine if the sewage sludge generated by the facility would be amenable to land application. As part of the pilot study, the facility conducted metals testing. The pollutant concentrations from sewage sludge analyses provided as part of the HL Mooney AWRF application for the permit reissuance are presented Attachment 16. All sewage sludge applied to the land must meet the ceiling concentration for pollutants, listed in Table 7. Sewage sludge applied to the land must also meet either pollutant concentration limits, cumulative pollutant loading rate limits, or annual pollutant loading rate limits, also listed in Table 7.

Cumulative pollutant loading limits or annual pollutant loading limits may be applied to sewage sludge exceeding pollutant concentration limits but meeting the ceiling concentrations, depending upon the levels of treatment achieved and the form (bulk or bag) of sludge applied. It should be noted that ceiling concentration limits are instantaneous values and pollutant concentration limits are monthly average values. Calculations of cumulative pollutant loading should be based on the monthly average values and the annual whole sludge application rate.

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TABLE 7- SEWAGE SLUDGE POLLUTANT LIMITS				
Pollutant	**Ceiling Concentration Limits for All Sewage Sludge Applied to Land (mg/kg)***	**Pollutant Concentration Limits for EQ and PC Sewage Sludge (mg/kg)***	**Cumulative Pollutant Loading Rate Limits for CPLR Sewage Sludge (kg/hectare)**	**Annual Pollutant Rate Limits for APLR Sewage Sludge (kg/hectare/356 day period)****
Arsenic	75	41	41	2.0
Cadmium	85	39	39	1.9
Copper	4,300	1,500	1,500	75
Lead	840	300	300	15
Mercury	57	17	17	0.85
Molybdenum***	75	---	---	---
Nickel	420	420	420	21
Selenium	100	100	100	5.0
Zinc	7,500	2,800	2,800	140
Applies to:	All sewage sludge that is land applied	Bulk sewage sludge and bagged sewage sludge	Bulk sewage sludge	Bagged sewage
From VPDES Permit Reg. Part VI	Table 1, 9VAC25-31-540	Table 3, 9VAC25-31-540	Table 2, 9VAC25-31-540	Table 4, 9VAC25-31-540
From VPA 9VAC25-32	Table 1, 9VAC25-32-356	Table 2, 9VAC25-32-356	Table 3, 9VAC25-32-356	Table 4, 9VAC25-32-356

*Dry-weight basis
**Bagged sewage sludge is sold or given away in a bag or other container.
***Molybdenum is currently under study by the EPA.

Comparing data from the facility with Table 7 shows that metal concentrations are significantly below the ceiling and PC concentration requirements.

3. Options for Meeting Land Application:

There are four equally safe options for meeting land application requirements. The options include the Exceptional Quality (EQ) option, the Pollutant Concentration (PC) option, the Cumulative Pollutant Loading Rate (CPLR) option, and the Annual Pollutant Loading Rate (APLR) option.

Pollutant Concentration (PC) is the type of sludge that may only be applied in bulk and is subject to general requirements and management practices; however, tracking of pollutant loadings to the land is not required. The sludge from the HL Mooney AWRF is considered Pollutant Concentration (PC) sewage sludge for the following reasons:

a. The bulk sewage sludge from the HL Mooney AWRF meets the PC limits in Table 1 of VPDES Permit Regulation Part VI, 9VAC25-31-540.

b. The VPDES Permit Regulation, Part VI, Subpart D, (9VAC25-31-690 through 720) establishes the requirements for pathogen reduction in sewage sludge. The HL Mooney AWRF can produce either Class A or Class B biosolids using the Bioset process. The facility can produce Class A biosolids under Alternative 6 for pathogen reduction. The facility can also produce Class B biosolids in accordance with the regulation (9VAC25-31-710.B.2. - Class B -Alternative 2. Alternative 2 defines Class B sludge as "Sewage sludge that is used or disposed that has been treated in a process that is equivalent to a Process to Significantly Reduce Pathogens (PSRP), as described in (9VAC25-31-710.D.).

c. The VPDES Permit Regulation, Part VI, Subpart D, (9VAC25-31-690 through 720) also establishes the requirements for Vector Attraction Reduction in sewage sludge. Based on the information supplied with the VPDES Sludge Application, the HL Mooney AWRF meets the requirements for Vector Attraction Reduction as defined by (9VAC25-31-720.B.1) whereby the Bioset process raises the pH of the sludge to 12 S.U. or higher by alkali addition and without the addition of more alkali, the pH remains at 12 S.U. or higher for 2 hours and then 11.5 S.U. or higher for an additional 22 hours.

4. Parameters to be Monitored:

   In order to assure the sludge quality, the following parameters require monitoring: Arsenic, Cadmium, Copper, Lead, Mercury, Molybdenum, Nickel, Selenium, and Zinc.

   In order to ensure that proper nutrient management and pH management practices are employed, the following parameters are required: pH, Total Kjeldahl Nitrogen, Ammonia Nitrogen, Nitrate Nitrogen, Total Phosphorus, Total Potassium, and Alkalinity (lime treated sludge should be analyzed for percent calcium carbonate equivalence). The nutrient and pH monitoring requirements apply only if the permittee land applies their own sludge. Since HL Mooney WRF will contract the land application responsibilities to an approved contractor, they are not required to monitor for nutrients, pH, Total Potassium and Alkalinity.

   Soil monitoring in conjunction with soil productivity information is critical, especially for frequent applications, to making sound sludge application decisions from both an environmental and an agronomic standpoint. Since HL Mooney AWRF will contract the land application responsibilities to an approved contractor, they are not required to perform soil monitoring.

5. Monitoring Frequency:

   The monitoring frequency is based on the amount of sewage sludge applied in a given 365-day period. The permit application indicates that the total dry metric tons of sewage sludge generated at HL Mooney AWRF are 5,722 dry metric tons per 365-day period. In the permit manual, the monitoring frequency for facilities that produce >1500 to 15,000 metric tons per 365-day period is six times per year (once every 2 months). This reissuance proposes a monitoring frequency of once every two months when sewage sludge is land applied.

   HL Mooney AWRF is required to provide the results of all monitoring performed in accordance with Part III, and information on management practices and appropriate certifications no later than February 19th of each year (as required by the 503 regulations) to the Northern Regional Office of the Department of Environmental Quality. Each report must document the previous calendar year's activities.

6. Sampling:

   Representative sampling is an important aspect of monitoring. Because the pollutant limits pertain to the quality of the final sewage sludge applied to the land, samples must be collected after the last treatment process prior to land application. Composite samples should be required for all samplings from this facility.

7. Biosolids Management Plan (BSMP):

   The BSMP is required to be part of the VPDES permit application. The VPDES Sewage Sludge Permit Application Form and its attachments will constitute the applicant's BSMP. Any proposed sewage treatment works treating domestic sewage must submit a BSMP with the appropriate VPDES permit application forms at least 180 days prior to the date proposed for commencing operations. The permittee shall conduct all sewage sludge use or disposal activities in accordance with the SMP approved with the issuance of this permit. Any proposed changes in the sewage sludge use or disposal practices or procedures followed by the permittee shall be documented and submitted for Virginia Department of Environmental Quality review and approval no less than 90 days prior to the effective date of the changes.

   Upon approval, the BSMP becomes an enforceable part of the permit. The permit may be modified or alternatively revoked and reissued to incorporate limitations/conditions necessitated by substantial changes in sewage sludge use or disposal practices.

   HL Mooney AWRF has submitted the VPDES Sewage Sludge Permit Application Form and its attachments. Their BSMP dated December 12, 2013 is on file at the Northern Regional Office of the Department of Environmental Quality.

8. Reporting Requirements:

   The reporting requirements are for POTWs with a design flow rate equal to or greater than 1 MGD (majors), POTWs that serve a population of 10,000 or greater, and Class I sludge management facilities. A permit special condition, which requires these generators to submit an annual report on February 19th of each year, is included. The HL Mooney AWRF shall use the Discharge Monitoring Report (DMR) forms as part of the annual report. A sample form (SP1 and S01 and SP2 and S02) with proper DMR parameter codes and its instructions are provided. In addition to the DMR forms, the generators who land apply sewage sludge are responsible for submitting the additional information required by 9VAC25-31-590, i.e., appropriate certification statements, descriptions of how pathogen and vector attraction reduction requirements are met, descriptions of how the management practices (if applicable) are being met, and descriptions of how site restrictions (if applicable) are being met.

9. Records Keeping:

This special condition outlines record retention requirements for sludge meeting Class A or Class B pathogen reduction and vector attraction reduction alternative 1-10. Table 8 presents the record keeping requirements.

Table 8: Record Keeping for PC Sludge	
1	Pollutant concentrations of each pollutant in Part III.A.1. and Part III.A.2. of the permit;
2	Description of how the pathogen reduction requirement in Part III.A.1. and Part I.A.2. of the permit are met;
3	Description of how the vector attraction requirements in Part III.A.1. and Part I.A.2. of the permit are met;
4	Description of how the management practice specified in the approved Biosolids Management Plan and/or the permit are met;
5	Description of how the site restriction specified in the Sludge Management Plan and/or the permit are met;
6	Certification statement in Part III.B.3.f. of the permit.

21. Other Special Conditions:

a. **95% Capacity Reopener.** The VPDES Permit Regulation at 9VAC25-31-200.B.4 requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.

b. **Indirect Dischargers.** Required by VPDES Permit Regulation, 9VAC25-31-200 B.1 and B.2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c. **O&M Manual Requirement.** Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190.E. The permittee shall maintain a current Operations and Maintenance (O&M) Manual. The permittee shall operate the treatment works in accordance with the O&M Manual and shall make the O&M Manual available to Department personnel for review upon request. Any changes in the practices and procedures followed by the permittee shall be documented in the O&M Manual within 90 days of the effective date of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.

d. **CTC, CTO Requirement.** The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.

e. **Licensed Operator Requirement.** The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9VAC25-31-200 C, and by the Board for Waterworks and Wastewater Works Operators and Onsite Sewage System Professionals Regulations (18VAC160-20-10 et seq.) requires licensure of operators. This facility requires a Class I operator.

f. **Reliability Class.** The Sewage Collection and Treatment Regulations at 9VAC25-790 require sewage treatment works to achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. Reliability means a measure of the ability of the treatment works to perform its designated function without failure or interruption of service. The facility is required to meet a reliability Class of I.

g. **Water Quality Criteria Reopener.** The VPDES Permit Regulation at 9VAC25-31-220 D. requires establishment of effluent limitations to ensure attainment/maintenance of receiving stream water quality criteria. Should effluent monitoring indicate the need for any water quality-based limitations, this permit may be modified or alternatively revoked and reissued to incorporate appropriate limitations.

h. **Biosolids/Sludge Reopener.** The VPDES Permit Regulation at 9VAC25-31-220.C requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA. The facility includes a sewage treatment works. This special condition shall be included in Part III of the permit.

i. **Sludge Use and Disposal.** The VPDES Permit Regulation at 9VAC25-31-100.P; 220.B.2, and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. The facility includes a treatment works treating domestic sewage. This special condition shall be included in Part III of the permit.

j. **E3/E4.** 9VAC25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

k. **Nutrient Reopener.** 9VAC25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9VAC25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

l. **TMDL Reopener.** This special condition is to allow the permit to reopened if necessary to bring it in compliance with any applicable TMDL that may be developed and approved for the receiving stream.

m. **PCB Pollutant Minimization Plan.** This special condition requires the permittee, upon notification from DEQ-NRO, to submit a Pollutant Minimization Plan (PMP) to identify known and unknown sources of low-level PCBs in the effluent. This special condition details the contents of the PMP and also requires an annual report on progress to identify sources.

n. **Final Effluent Monitoring Frequency.** The Sewage Collection and Treatment Regulations require that a facility with a 24.0 MGD design flow collect conventional and Bacteria samples once a day. When the facility's monthly average flow reaches 16 MGD for 3 consecutive months at the 24.0 MGD flow tier, the facility shall begin daily monitoring for $CBOD_5$, TSS, and *E. coli*. This special condition shall not affect the monitoring frequency of any other parameters. If the facility has any exceedances of the numerical limitations associated with the parameters with the frequency reductions, upon written notification from DEQ, the facility shall increase the frequency of the monitoring to daily for $CBOD_5$, TSS, and *E. coli* for the remaining term of the permit.

o. **Application for Reclamation and Reuse and Reclaimed Water Management Plan.** In accordance with the current Water Reclamation and Reuse Regulation at 9VAC-25-740-10 *et seq*, the permittee shall submit to DEQ-NRO for review and approval, a detailed application and Reclaimed Water Management Plan at least 180 days prior to the expected commencement date for reuse. No reuse or reclamation shall occur until the facility is given administrative authorization from DEQ.

22. Permit Section Part II.

Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

23. Changes to the Permit from the Previously Issued Permit:

a. Special Conditions:
1) The PCB monitoring special condition has been removed since the facility has completed the necessary sampling.
2) A special condition for a PCB Pollutant Minimization Plan has been included.
3) A special condition for the submittal of an Application for Reuse and Reclamation and a Reclaimed Water Management Plan has been included.
4) Since the facility is considering the land application of Class A or Class B biosolids through a contractor, the necessary special conditions were included in the draft permit.

b. Monitoring and Effluent Limitations:
1) The 18 MGD flow tier and associated limits and monitoring were removed since the facility received the CTO for the 24 MGD flow tier.
2) Since the facility is considering the land application of Class A or Class B biosolids through a contractor, the necessary monitoring and limitations were included in the draft permit.
3) The requirement for acute whole effluent toxicity testing has been removed from the permit since the facility has exhibited no acute toxicity problems with the effluent. The chronic whole effluent toxicity testing remains in the draft permit.

4) The authority to discharge stormwater through Stormwater Outfalls 001-007 was included with this permit since the facility received a No Exposure Certification and the General Permit for Storm Water Discharges Associated with Industrial Activity was terminated.

24. Variances/Alternate Limits or Conditions:

With the last reissuance, the facility was granted monitoring frequency reductions at their 18 MGD flow tier for cBOD, TSS, and *E. coli* based on the compliance history of the facility. While the facility received the CTO for the 24 MGD tier in November 2010, the monthly average flow at the facility has been approximately 13 MGD from August 2012 through August 2013. Since the flows were still well under the design flow, DEQ granted the reduced monitoring frequencies for the 24 MGD flow tier until the monthly average flow reaches 16 MGD for three consecutive months. At that time, the frequency shall be daily.

25. Public Notice Information:

First Public Notice Date: 8/20/2014 Second Public Notice Date: 8/27/2014

Public Notice Information is required by 9VAC25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193, Telephone No. (703) 583-3834, Alison.Thompson@deq.virginia.gov. See Attachment 17 for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may request an electronic copy of the draft permit and fact sheet or review the draft permit and application at the DEQ Northern Regional Office by appointment.

26. Additional Comments:

Previous Board Action(s): None.

Public Comment: Minor comments were received from the facility and have been addressed.

27. Development of the Policy for the Potomac River Embayments (9VAC25-415-10)

The information is carried forward with this reissuance so the history is maintained as part of the permit file.

The State Water Control Board adopted the Potomac Embayment Standards (PES) in 1971 to address serious nutrient enrichment problems evident in the Virginia embayments and Potomac River at the time. These standards applied to sewage treatment plants discharging into Potomac River embayments in Virginia and for expansions of existing plants discharging into the non-tidal tributaries of these embayments. The standards were actually effluent limitations for BOD, unoxidized nitrogen, total phosphorus, and total nitrogen:

Parameter	**Effluent Limitations (monthly average)**
BOD_5	3 mg/L
Unoxidized Nitrogen	1 mg/L (April – October)
Total Phosphorus	0.2 mg/L
Total Nitrogen	8 mg/L (when technology is available)

Based upon these standards, several hundred million dollars were spent during the 1970s and 1980s upgrading major treatment plants in the City of Alexandria and the Counties of Arlington, Fairfax, Prince William, and Stafford. Today, these localities operate advanced wastewater treatment plants, which have contributed a great deal to the dramatic improvement in the water quality of the upper Potomac estuary.

Before the planned upgrades at these facilities were completed, and the fact that water quality improved, questions arose over the high capital and operating costs that would result from meeting all of the requirements contained in the PES. Questions also arose due to the fact that the PES limits were blanket effluent limitations that applied equally to different bodies of water. Therefore, in 1978, the State Water Control Board committed to reevaluate the PES. In 1984, a major milestone was reached when the Virginia Institute of Marine Science (VIMS) completed state-of-the-art models for each of the embayments. The Board then selected the Northern Virginia Planning District Commission (NVPDC) to conduct wasteload allocation studies of the Virginia embayments using the VIMS models. In 1988, these studies were completed and effluent limits that would protect the embayments and the main stem of the Potomac River were developed for each major facility. The studies and all pertinent information are on file in the DEQ Northern Region Office.

Since the PES had not been amended or repealed, VPDES permits had included the PES standards as effluent limits. Since the plants could not meet all of the requirements of the PES, the plant owners operated under consent orders or consent decrees with operating effluent limits for the treatment plants that were agreed upon by the owners and the Board.

In 1991 and 1992, several Northern Virginia jurisdictions with embayment treatment plants submitted a petition to the Board requesting that the Board address the results of the VIMS/NVPDC studies. Their petition requested revised effluent limitations and a defined modeling process for determining effluent limitations.

The recommendations in the petition were designed to protect the extra sensitive nature of the embayments along with the Potomac River that have become a popular recreational resource during recent years. The petition included requirements more stringent than would be applied using the results of the modeling/allocation work conducted in the 1980s. With the inherent uncertainty of modeling, the petitioners question whether the results of modeling would provide sufficient protection for the embayments. By this petition, the local governments asked for continued special protection for the embayments based upon a management approach that uses stringent effluent limits. They believe this approach has proven successful over the past two decades. In addition the petition included a modeling process that will be used to determine if more stringent limits are needed in the future due to increased wastewater discharges.
The State Water Control Board adopted the petition, with revisions, as a regulation on September 12, 1996. The regulation is entitled *Policy for the Potomac River Embayments* (9VAC25-415-10). On the same date, the Board repealed the old PES. The new regulation became effective on April 3, 1997, and contains the following effluent limits:

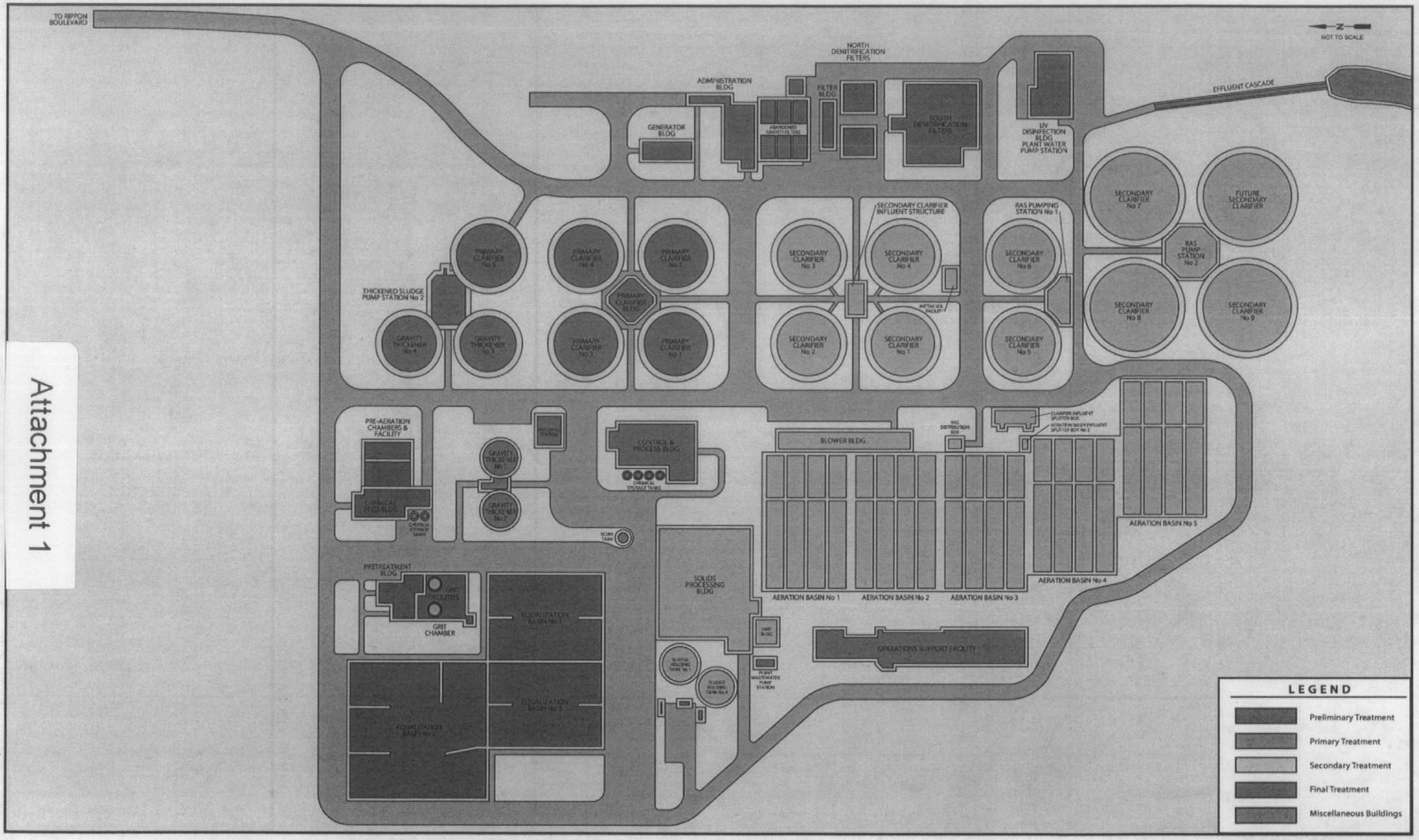
Parameter	Effluent Limitations (monthly average)
$CBOD_5$	5 mg/L
TSS	6 mg/L
Total Phosphorus	0.18 mg/L
Ammonia as Nitrogen	1.0 mg/L

9VAC25-415-50 Water Quality Monitoring. The Policy says "that water quality models may be required to predict the effects of wastewater discharges on the water quality of the receiving waterbody, the embayment, and the Potomac River. The purpose of the modeling shall be to determine if more stringent limits than those required by 9VAC25-415-40 (the Policy's effluent limitations) are required to meet water quality standards."

VA0025101 Attachments to the Fact Sheet

Attachment 1	Facility Schematic
Attachment 2	No Exposure Inspection and Approval Letter
Attachment 3	Topographic Map
Attachment 4	Site Inspection from September 21, 2012
Attachment 5	Planning Statement
Attachment 6	Dissolved Oxygen Criteria for Class II Waters
Attachment 7	Water Quality Criteria and Wasteload Allocation Analysis
Attachment 8	Instream Monitoring Report
Attachment 9	Documentation for the Summer Weekly Average Ammonia Limitation
Attachment 10	DGIF Database Search
Attachment 11	Site Specific Dilution Study and Nearfield Mix Analysis
Attachment 12	Ammonia as N Dilution and Decay
Attachment 13	Potomac Embayment WLA Study
Attachment 14	Statistical Limitation Analysis
Attachment 15	Whole Effluent Toxicity Summary
Attachment 16	Sludge Analysis Reports
Attachment 17	Public Notice

Attachment 1

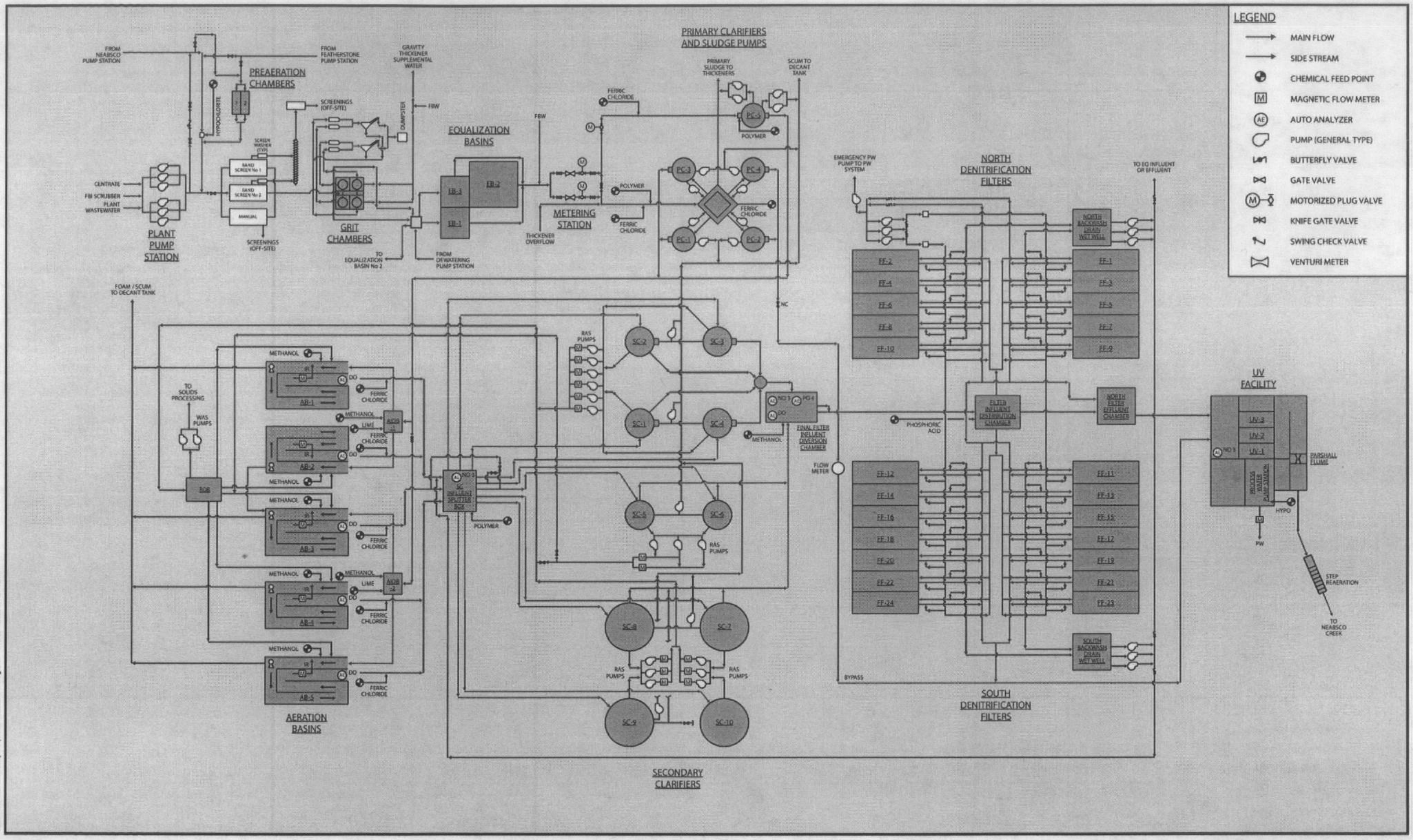


C:\MYPROJS\HL Mooney\Site Plan - Revised 02/07/11 - S. Trulli

Prince William County Service Authority
H.L. Mooney Water Reclamation Facility

Figure 1-2 - Site Plan

CDM



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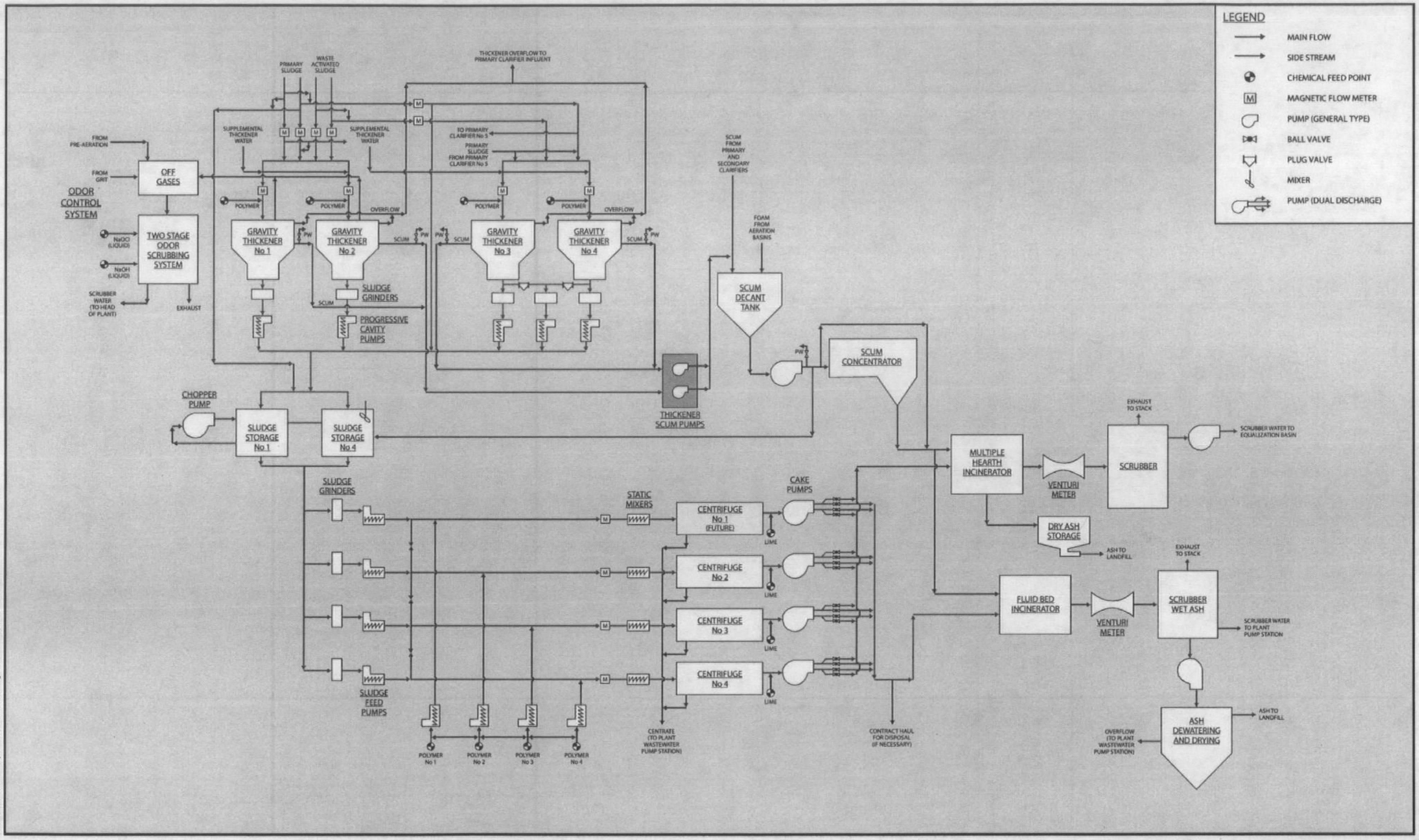
Prince William County Service Authority
H.L. Mooney Water Reclamation Facility

Figure ?-?
Liquids Process Flow Diagram

CDM



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Prince William County Service Authority
H.L. Mooney Water Reclamation Facility

CDM

Figure ?-?
Solids Process Flow Diagram

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
NORTHERN REGIONAL OFFICE
13901 Crown Court, Woodbridge, Virginia 22193
(703) 583-3800 Fax (703) 583-3821
www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

Thomas A. Faha
Regional Director

April 11, 2014

Mr. Stephen M. Bennett
Deputy Director, Water Reclamation
H.L. Mooney Advanced Water Reclamation Facility
P.O. Box 2266
Woodbridge, VA 22195-2266

Re: Termination of Virginia Pollutant Discharge Elimination System (VPDES) General Permit for Storm Water Discharges Associated with Industrial Activity – VAR051424

Dear Mr. Bennett:

Based on a site review conducted February 28, 2014, the Department of Environmental Quality - Northern Regional Office has approved a no-exposure certification request received on January 15, 2014, for the H.L. Mooney Advanced Water Reclamation Facility. Pursuant to 9VAC25-151-50 C, an owner covered by the VPDES General Permit for Storm Water Discharges Associated with Industrial Activity who is later able to file a no-exposure certification to be excluded from permitting is no longer authorized by nor required to comply with this permit. Additionally, if the owner is no longer required to have permit coverage due to a no-exposure exclusion, the owner is not required to submit a notice of termination. As such, the Department of Environmental Quality has approved the termination of the Permit referenced above. Termination of this permit does not prohibit the discharge of storm water from the H.L. Mooney Advanced Water Reclamation Facility. Additionally, termination of this permit does not change or alter terms and conditions of the facility's individual permit nor does this termination relieve the facility from complying with the individual permit (VA0025101). Termination of this permit is effective thirty days from the date of this notification (May 11, 2014) unless you provide an objection in accordance with one of the two paragraphs below.

As provided by Rule 2A:2 of the Supreme Court of Virginia, you have thirty days from the date you received this decision within which to appeal this decision by filing a notice of appeal in accordance with the Rules of the Supreme Court of Virginia with the Director, Virginia Department of Environmental Quality.

Alternatively, any owner under §§ 62.1-44.16, 62.1-44.17 and 62.1-44.19 of the State Water Control Law aggrieved by any action of the State Water Control Board taken without a formal hearing, or by inaction of the Board, may demand in writing a formal hearing of such owner's grievance, provided a petition requesting such hearing is filed with the Board. Said agreement must meet the requirements set forth in §1.23 (b) of the Board's Procedural Rule No. 1.

Please note that should a discharge arise in accordance with 9VAC25-31-100, Application for a Permit, the H.L. Mooney Advanced Water Reclamation Facility shall be responsible for complying with Virginia State Water Control Laws and Regulations. Additionally, coverage may be necessary at a later date should changes to regulations be implemented or site activities change.

Attachment 2

Should you have any questions or need any additional information, please contact Susan Mackert at (703) 583-3853 or by email at susan.mackert@deq.virginia.gov.

Sincerely,

Bryant Thomas
Water Permits and Planning Manager

Enc: Site memorandum

cc: File – VAR051424
Sharon Allen – DEQ Compliance Inspector (without enclosure)
Becky Vice – DEQ Compliance Auditor (without enclosure)
Evelyn Mahieu – Director, Environmental Services and Water Reclamation (with enclosure)
Maureen O'Shaughnessy – Prince William County Service Authority (with enclosure)

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHERN REGIONAL OFFICE

13901 Crown Court Woodbridge, VA 22193

SUBJECT: H.L. Mooney Advanced Water Reclamation Facility (VAR051424)

TO: File

FROM: Susan Mackert

DATE: April 7, 2014

COPIES: Mr. Stephen M. Bennett – Deputy Director, Water Reclamation
Ms. Evelyn Mahieu – Director, Environmental Services and Water Reclamation
Ms. Maureen O'Shaughnessy – Prince William County Service Authority

A site visit was performed on February 28, 2014, to assess drainage patterns, point source discharge locations, and permit applicability for the referenced facility. Additionally, the site visit was conducted to verify information provided in a no-exposure certification request received January 15, 2014.

General Site Observations

- The facility operates under SIC Code 4952 (wastewater treatment) which falls under Sector T – Treatment Works of the Virginia Pollutant Discharge Elimination System (VPDES) General Permit for Storm Water Discharges Associated with Industrial Activity (SWGP).

- The facility is an advanced wastewater treatment plant with a design flow of 24 Million Gallons Per Day (MGD).

- The facility comprises approximately 38 acres with paved and grass surfaces and consists of office buildings and typical wastewater treatment process units.

- The facility has seven storm water outfalls.

  - Storm water Outfall 001 is located adjacent to the facility's final effluent discharge point for VPDES permit VA0025101 (photo 1) at the southeast corner of the plant. The drainage area to this outfall is 5.75 acres of which 2.28 acres are considered impervious The drainage area consists of paved areas adjacent to the secondary clarifiers (photos 2 – 3) and a grassy area adjacent to the UV building (photo 4). Storm water flows over heavy rip rap before discharging to Neabsco Creek.

  - Storm water Outfall 002 is located on the east side of the facility behind the existing administration building (photo 5) with discharge to Neabsco Creek. The drainage area to this outfall is 5.25 acres of which 3.15 acres are considered impervious. At the time of the site visit, all drains to storm water Outfall 002 were blocked due to construction activities. Once construction is completed, the drainage area to storm water Outfall 002 will consist of runoff from the new administration and laboratory building and its associated parking lot. It should be noted that storm water Outfall 002 is also regulated under the Virginia Storm Water Management Program (VSMP) for discharges of storm water from construction activities.

  - Storm water Outfall 003 is located on the south end of the facility. The drainage area to this outfall is 0.95 acres of which 0.70 acres are considered impervious. The drainage area consists of paved areas adjacent to the aeration basins. Storm water flows over heavy rip rap before discharging to Neabsco Creek (photos 6 – 7).

  - Storm water Outfall 004 is the outlet of a storm water pond located on the west side of the facility (photo 8) which discharges to Neabsco Creek. The drainage area to this outfall is 3.85 acres of which 1.8 acres are considered impervious. The drainage area to this outfall consists of paved areas adjacent to the preliminary treatment and ash handling areas (photos 9 – 10) as well as a paved road (photos 11 – 12).

- Storm water Outfall 005 is located on the northwest corner of the facility (photo 13) with discharge to Neabsco Creek. The drainage area to this outfall is 15.25 acres of which 1.9 acres are considered onsite impervious and 0.60 acres are considered off site impervious. The drainage area to this outfall consists of paved and grassy areas adjacent to the headworks and preliminary treatment area (photos 14 – 15).

- Storm water Outfall 006 is located on the west side of the facility (photo 16) with discharge to Neabsco Creek. The drainage area to this outfall is 0.5 acres of which 0.35 acres are considered impervious. The drainage area consists of a small paved and grassy area adjacent to the solids building (photo 17).

- Storm water Outfall 007 is located on the southwest side of the facility (photo 18) with discharge to Neabsco Creek. The drainage area to this outfall is 0.7 acres of which 0.7 acres are considered impervious. The drainage area to this outfall consists of paved area adjacent to the aeration basins (photo 19).

- Areas of potential storm water contamination include the ash handling area (photos 20 – 21), septage hauler unloading area (photo 22), the vehicle wash area (photo 23), and a loading dock area (photo 24). Storm water from all of these areas is directed to an in plant pump station and is returned to the headworks. As such, there is no reasonable potential for these areas to impact storm water quality.

Staff Recommendations

The requirements found within 9VAC25-151 are applicable to point source storm water discharges associated with industrial activity. Based on observations made during the site visit, it is staff's best professional judgement that there is no reasonable potential for the industrial activity at the H.L. Mooney Advanced Water Reclamation Facility to impact storm water quality. Storm water discharges are comprised primarily of runoff from paved and grassy areas. Discharges such as this are currently exempt from coverage under the general industrial storm water permit. Any areas of potential storm water contamination are directed to an in plant pump station and are returned to the headworks thereby not impacting storm water quality.

The facility maintains coverage under the VPDES General Permit for Storm Water Discharges Associated with Industrial Activity (VAR051424). Pursuant to 9VAC25-151-50 C, an owner covered by the VPDES General Permit for Storm Water Discharges Associated with Industrial Activity who is later able to file a no-exposure certification to be excluded from permitting is no longer authorized by nor required to comply with this permit. Additionally, if the owner is no longer required to have permit coverage due to a no-exposure exclusion, the owner is not required to submit a notice of termination. Please note that if a discharge arises in accordance with 9VAC25-31-100, Application for a Permit, the H.L. Mooney Advanced Water Reclamation Facility shall be responsible for complying with Virginia State Water Control Law and Regulations. Additionally, coverage may be necessary at a later date should changes to regulations be implemented or site activities change.

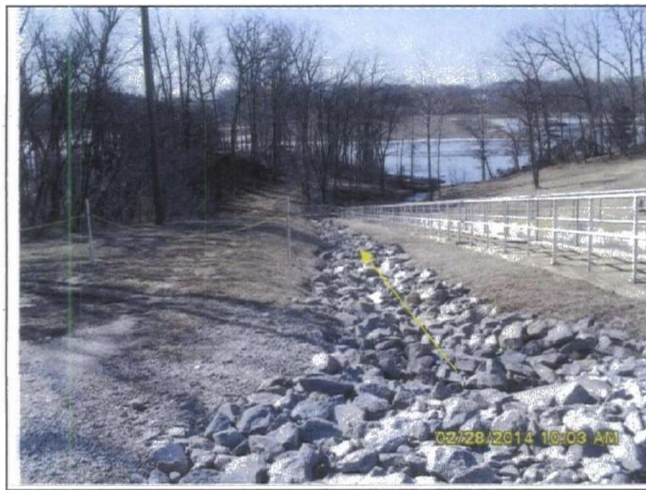


Photo 1. Storm water Outfall 001. Flow is in the direction of the arrow to Neabsco Creek.

Photo 2. Drainage area to storm water Outfall 001.

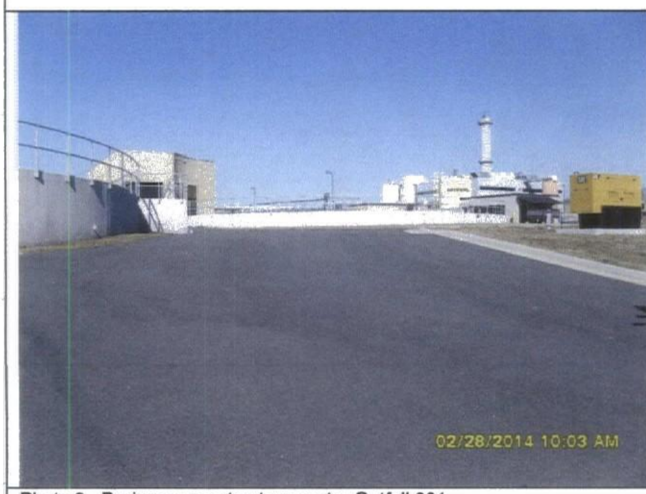


Photo 3. Drainage area to storm water Outfall 001.

Photo 4. Drainage area to storm water Outfall 001.

Photo 5. Storm water Outfall 002.

Photo 6. Storm water Outfall 003.

Photo 7. Storm water Outfall 003. Flow is in the direction of the arrow to Neabsco Creek.

Photo 8. West storm water pond. The outlet of this pond is storm water Outfall 004. Discharge is to Neabsco Creek.

Photo 9. Drainage area to storm water Outfall 004.

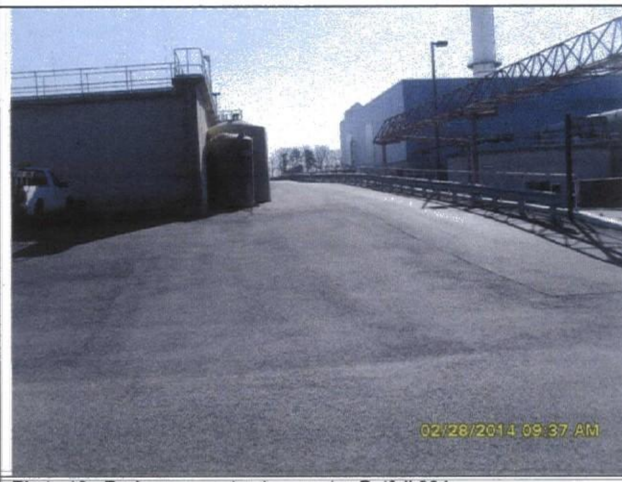


Photo 10. Drainage area to storm water Outfall 004.

Photo 11. Drainage area to storm water Outfall 004.

Photo 12. Flow from the drainage from area shown in photo 11 enters the corrugated pipe which then enters the storm water pond shown in photo 8.

Photo 13. Storm water Outfall 005. Flow is in the direction of the arrow to Neabsco Creek.

Photo 14. Drainage area to storm water Outfall 005.

Photo 15. Drainage area to storm water Outfall 005.

Photo 16. Storm water Outfall 006 (noted by arrow).

Photo 17. Drainage area to storm water Outfall 006.

Photo 18. Storm water Outfall 007. Flow is in the direction of the arrow.

Photo 19. Drainage area to storm water Outfall 007.

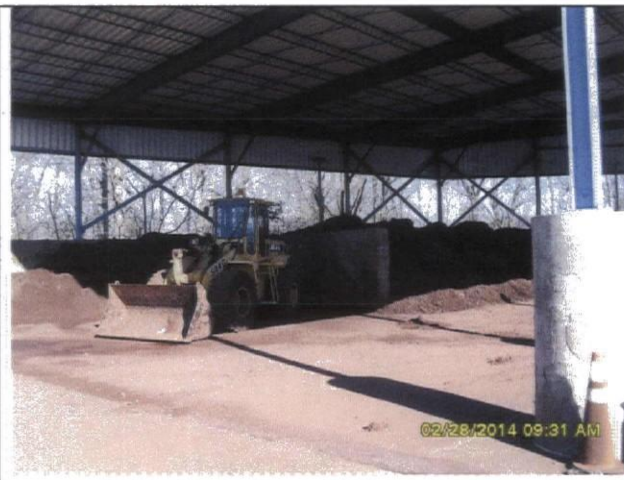


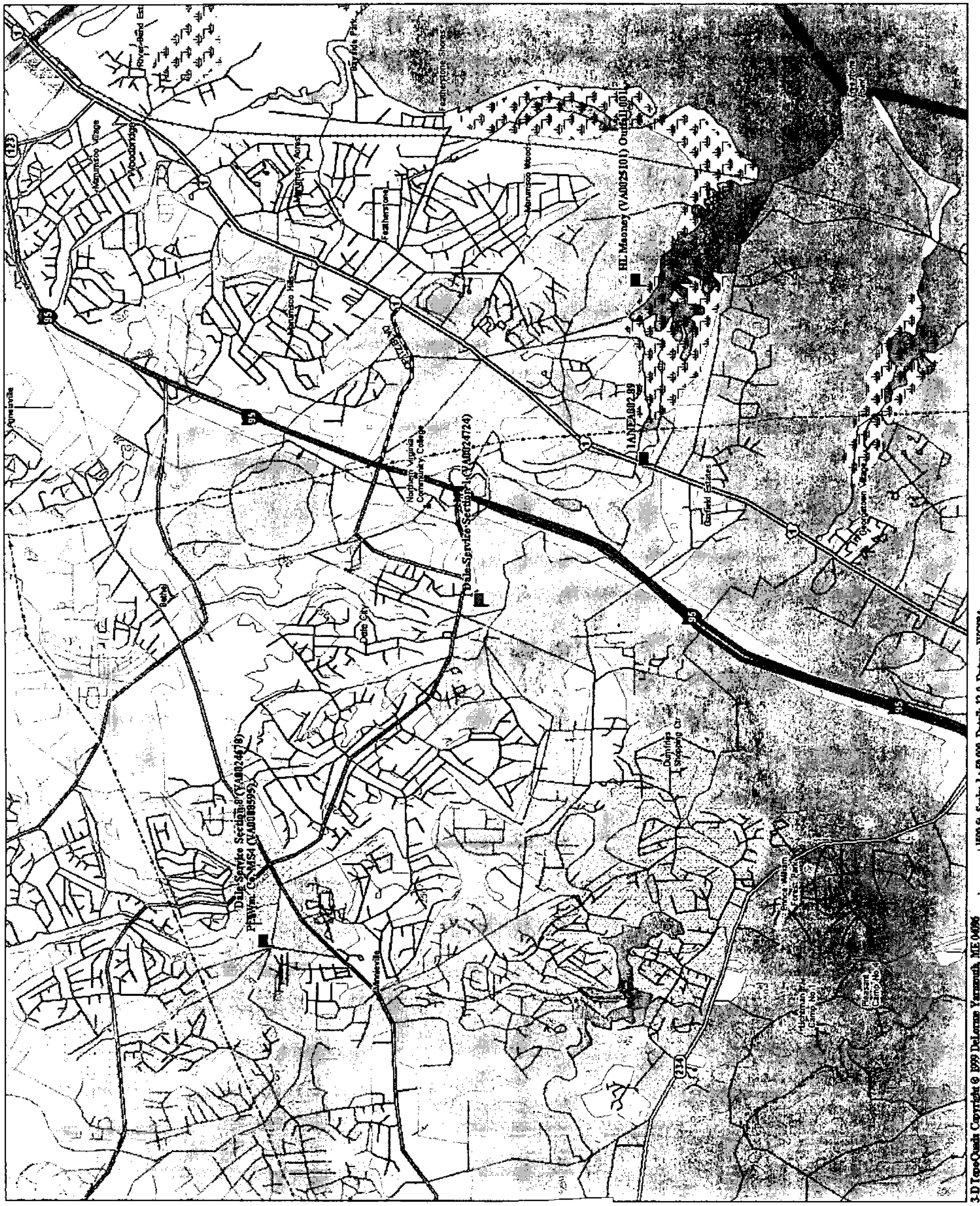
Photo 20. Ash handling area.

Photo 21. Trench drain adjacent to ash handling area which is directed to an in plant pump station and is returned to the headworks.

Photo 22. Septage hauler unloading area.

Photo 23. Vehicle wash area.

Photo 24. Loading dock area.



Attachment 3

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
NORTHERN REGIONAL OFFICE
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www.deq.virginia.gov

Douglas W. Domenech
Secretary of Natural Resources

David K. Paylor
Director

Thomas A. Faha
Regional Director

October 19, 2012

Mr. Charles Weber
Director of Engineering and Water Reclamation
Prince William County Service Authority
P.O. Box 2266
Woodbridge, VA 22195

Re: **H.L. Mooney Water Reclamation Facility, Permit #VA0025101**

Dear Mr. Weber:

Attached is a copy of the technical and laboratory inspection report generated from observations made on September 21, 2012 while conducting a Facility Technical Inspection at the H.L. Mooney – Water Reclamation Facility (WRF). This letter is not intended as a case decision under the Virginia Administrative Process Act, Va. Code § 2.2-4000 *et seq.* (APA). The compliance staff would like to thank Mr. Robert Litzinger for his time and assistance during the inspection.

Additional inspections may be conducted to confirm that the facility is in compliance with permit requirements.

If you have any questions or comments concerning this report, please feel free to contact me at the Northern Regional Office at (703) 583-3882 or by e-mail at Sharon.Allen@deq.virginia.gov.

Sincerely,

Sharon Allen

Sharon Allen
Environmental Specialist II

Electronic copy sent:
- Compliance Manager, Compliance Auditor, Permits / DMR File – DEQ
- EPA- Region III
- Steve Bennett, Robert Litzinger – H.L. Mooney WRF

Attachment 4

DEQ
WASTEWATER FACILITY INSPECTION REPORT
PREFACE

VPDES/State Certification No.	(RE) Issuance Date	Amendment Date	Expiration Date
VA0025101	**July 1, 2009**		**Jun 30, 2014**

Facility Name	Address	Telephone Number
H.L. Mooney Water Reclamation Facility	**1851 Rippon Blvd.** **Woodbridge, VA**	**(703) 393-2065**
Owner Name	Address	Telephone Number
Prince William County Service Authority	**PO Box 2266** **Woodbridge, VA 22195**	**(703) 335-7929**
Responsible Official	Title	Telephone Number
Charles R. Weber	**Director of Engineering & Water Reclamation**	**(703) 335-7929**
Responsible Operator	Operator Cert. Class/number	Telephone Number
Robert Litzinger	**Class I; 1909000168**	**(703) 393-2065**

TYPE OF FACILITY:

DOMESTIC				INDUSTRIAL			
Federal		Major	**X**	Major		Primary	
Non-federal	**X**	Minor		Minor		Secondary	

INFLUENT CHARACTERISTICS:		DESIGN:	
[redacted]	Flow	**24 MGD**	[redacted]
	Population Served	**250,000**	
	Connections Served	**85,000**	
	BOD_5 (June-Aug 2012)	**215**	
	TSS (June-Aug 2012)	**218**	

EFFLUENT LIMITS: SPECIFY UNITS

Parameter	Min.	Avg.	Max.	Parameter	Min.	Avg.	Max.
Flow (MGD)		**18**	**NL**	**pH (S.U.)**	**6.0**		**9.0**
DO	**6.0**			**E. coli, n/100mls (geometric mean)**		**126**	
$cBOD_5$		**5**	**8**	**TSS**		**6**	**9**
NH_3-N (Apr-Oct)		**1.0**	**4.4**	**NH_3-N (Nov-Jan)**		**NL**	**NL**
NH_3-N (Feb-Mar)		**4.6**	**5.5**	**Nitrate + Nitrite**		**NL**	**NA**
TKN		**NL**	**NA**	**Total N**		**NL**	**NA**
Total Phosphorus		**.18**	**.27**				

[redacted]	Receiving Stream	**Neabsco Creek**	[redacted]
	Basin	**Potomac River**	
	Discharge Point (LAT)	**38º 36′ 39″**	
	Discharge Point (LONG)	**77º 16′ 13″**	

Problems identified at last inspection: July 7, 2012

		Corrected	Not Corrected
1.	Influent screenings that fall to the ground while the dumpster is being moved or emptied must be cleaned up and disposed of properly.	[X]	[ ]
2.	The plants growing along the side of the step cascade structure are overgrowing the walkway and may cause damage as they grow. The plants should be removed.	[X]	[ ]
3.	pH- The buffer values read off the meter during calibration are not recorded on the bench sheets. The bench sheet should include the analysis method number and identify the edition of Standard Methods that is the source of the method.	[X]	[ ]
4.	DO- The bench sheet should include the analysis method number and identify the edition of Standard Methods that is the source of the method.	[X]	[ ]
5.	The auto sampler temperature was recorded as being 0.1 °C on 6/28/10. The recorded sampler temperature was 2.4 on 6/27/10 and 3.7 on 6/29/10. If adjustments were made to the sampler, it should be noted in log book or on data sheet.	[X]	[ ]

SUMMARY- SEPTEMBER 2012

COMMENTS:

- **DEQ does not object to operators analyzing DO at the top of the step aeration structure in the wintertime if conditions make the steps/path to the bottom of the structure unsafe (e.g. due to ice or snow).**

  The facility must have an SOP outlining conditions under which the DO will be analyzed at the top of the step aeration structure rather than the bottom; and the sample location should be noted on the operator's bench sheet.

- **The EPA published their Final Rule on the latest Methods Update to 40 CFR Part 136 in the Federal Register on May 18, 2012. In this update, EPA has changed the way in which approved methods in Standard Methods are to be identified.**

  Only the most recent version of a method is EPA approved. Permittees referencing Standard Methods must list the method number followed by the year of publication (e.g. pH = SM 4500-H+ B 1992).

  This change is applicable to documentation of the field analyses conducted by operators as well as to analyses performed in a certified laboratory. The method reference should be updated on operator log sheets and SOPs.

- **The WRF staff is commended for keeping an orderly and well-maintained facility.**

REQUEST for CORRECTIVE ACTION:

- **None at this time.**

Virginia Department of Environmental Quality

FOCUSED CEI TECH/LAB INSPECTION REPORT

FACILITY NAME: H.L. Mooney WRF		**INSPECTION DATE:**	**September 21, 2012**
		INSPECTOR	**S. Allen**
PERMIT No.:	**VA0025101**	**REPORT DATE:**	**October 19, 2012**
TYPE OF FACILITY:	☑ Municipal ☑ Major ☐ Industrial ☐ Minor ☐ Federal ☐ Small Minor ☐ HP ☐ LP	**TIME OF INSPECTION:**	Arrival **0845** / Departure **1120**
		TOTAL TIME SPENT (including prep & travel)	**25 hours**
PHOTOGRAPHS:	☑ Yes ☐ No	**UNANNOUNCED INSPECTION?**	☑ Yes ☐ No
REVIEWED BY / Date:	10/18/12		
PRESENT DURING INSPECTION:	**Robert Litzinger- Operations Manager, H.L. Mooney WRF**		

TECHNICAL INSPECTION

1. Has there been any new construction? • If so, were plans and specifications approved? Comments: **CTO issued November 8, 2012.**	☑ Yes ☐ No
2. Is the Operations and Maintenance Manual approved and up-to-date? Comments: **Received Oct 24, 2011.**	☑ Yes ☐ No
3. Are the Permit and/or Operation and Maintenance Manual specified licensed operator requirements being met? Comments:	☑ Yes ☐ No
4. Are the Permit and/or Operation and Maintenance Manual specified operator staffing requirements being met? Comments:	☑ Yes ☐ No
5. Is there an established and adequate program for training personnel? Comments:	☑ Yes ☐ No
6. Are preventive maintenance task schedules being met? Comments: **Work orders are generated weekly, monthly, and yearly.**	☑ Yes ☐ No
7. Does the plant experience any organic or hydraulic overloading? Comments: **In Feb 2011, the facility experienced a partial bypass of the Denitrification Filters. The bypass resulted from I&I from a rain event that occurred while the majority of units were off line as part of a plant performance test. The I&I hydraulically overloaded the units that were on-line, resulting in solids lost from the clarifiers blinding the filters. Approximately 141,000 gallons of secondary effluent bypassed the filters over a period of three hours (3:50 am – 6:50 am). The flow was represented in the facility's composite sample for that day.** **Under normal operations the plant does not experience hydraulic overloading. High flows are generally controlled by use of the EQ basins.**	☐ Yes ☐ No

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8. Have there been any bypassing or overflows since the last inspection? Comments: **See incident described above. Additionally, the Denite filters were bypassed several times during construction with DEQ approval.**	☑ Yes ☐ No
9. Is the standby generator (including power transfer switch) operational and exercised regularly? Comments: **Two new generators (2.5 megawatts each) not yet in service; are in the final programming stages; will be tested monthly under load.**	☐ Yes ☐ No
10. Is the plant alarm system operational and tested regularly? Comments:	☑ Yes ☐ No
11. Is sludge disposed of in accordance with the approved sludge management plan? Comments: **Incinerated.**	☑ Yes ☐ No
12. Is septage received? • If so, is septage loading controlled, and are appropriate records maintained? Comments: **Records kept by lab staff**	☑ Yes ☐ No
13. Are all plant records (operational logs, equipment maintenance, industrial waste contributors, sampling and testing) available for review and are records adequate? Comments:	☑ Yes ☐ No

14. Which of the following records does the plant maintain?

☑ Operational logs ☑ Instrument maintenance & calibration

☑ Mechanical equipment maintenance ☐ Industrial Waste Contribution (Municipal facilities)

Comments:

15. What does the operational log contain?

☑ Visual observations ☐ Flow Measurement ☐ Laboratory results ☑ Process adjustments

☐ Control calculations ☐ Other (specify)

Comments:

16. What do the mechanical equipment records contain?

☑ As built plans and specs ☑ Manufacturers instructions ☑ Lubrication schedules

☐ Spare parts inventory ☑ Equipment/parts suppliers

☐ Other (specify)

Comments:

17. What do the industrial waste contribution records contain (Municipal only)?

☐ Waste characteristics ☐ Impact on plant ☐ Locations and discharge types

☐ Other (specify) NA

Comments: **PWCSA has been involved in the development of a pretreatment ordinance for Prince William County and is voluntarily pursuing implementation of a pretreatment program.**

18. Which of the following records are kept at the plant and available to personnel?

☑ Equipment maintenance records ☑ Operational log ☑ Industrial contributor records

☑ Instrumentation records ☑ Sampling and testing records

Comments:

19. List records not normally available to plant personnel and their location:
Comments: **None**

20. Are the records maintained for the required time period (three or five years)? Comments:	☑ Yes ☐ No

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UNIT PROCESS EVALUATION SUMMARY SHEET

UNIT PROCESS	APPLICABLE	PROBLEMS*	COMMENTS
Sewage Pumping	Y		*Pump station for plant return flows. Added to incoming influent prior to pre-aeration chambers.*
Screening/Comminution	Y		*Two mechanical band screens operate based on water level/flow differential. One manual bar screen.*
Grit Removal	Y		*Four grit removal tanks, four grit cyclone separators, and two grit classifiers. No units in use during this inspection.*
Oil/Water Separator	N		
Flow Equalization	Y		*Three EQ tanks, one 2 MG and one 4MG in service.*
Flow Measurement (Influent)	Y		*Plant influent readings are recorded at the influent metering station, representing flow that is actually entering the plant.*
Ponds/Lagoons	N		
Imhoff Tank	N		
Primary Sedimentation	Y		*Five 95 foot diameter primary clarifiers, two in service. Sludge is sent to gravity thickeners.*
Flocculation	Y		*Ferric acid is added for phosphorous removal.*
Trickling Filter	N		
Septic Tank and Sand Filter	N		
Rotating Biological Contactor	N		
Activated Sludge Aeration	N		
Biological Nutrient Removal	Y		*Five 4-pass basins, four basins in service. 1.5 tons lime added to aeration basins. Methanol added at final zone.*
Sequencing Batch Reactor			
Secondary Sedimentation	Y		*Nine clarifiers , four currently on line (three 125 ft diameter and one 95 foot diameter clarifiers)*
Flocculation	N		
Tertiary Sedimentation	N		
Filtration	Y		*24 Denitrification filters, 18 in service. Not currently being operated for denitrification; filtering only.*
Micro-Screening	N		
Activated Carbon Adsorption	N		
Chlorination	N		
Dechlorination	N		
Ozonation	N		

Revised: 06-2011

UNIT PROCESS	APPLICABLE	PROBLEMS*	COMMENTS
Ultraviolet Disinfection	**Y**		*Trojan 3000+*
Post Aeration	**Y**		*Step aeration*
Flow Measurement (Effluent)	**Y**		
Land Application (Effluent)	**N**		
Plant Outfall	**Y**		*No problems noted*
Sludge Pumping	**Y**		
Flotation Thickening (DAF)	**N**		
Gravity Thickening	**Y**		*Four thickeners, one in use. Two 95 ft diameter thickeners, two 50 ft diameter.*
Sludge Holding Tank	**Y**		*Two sludge storage tanks hold sludge prior to pumping to centrifuges.*
Aerobic Digestion	**N**		
Anaerobic Digestion	**N**		
Lime Stabilization	**N**		
Centrifugation	**Y**		*Three centrifuges.*
Sludge Press	**N**		
Vacuum Filtration	**N**		
Thermal Treatment	**N**		
Incineration	**Y**		*The fluidized bed incinerator is run at night; run generally completed by 12:00 noon the following day.*
Drying Beds	**N**		
Composting	**N**		
Land Application (Sludge)	**N**		

* Problem Codes

1. Unit Needs Attention
2. Abnormal Influent/Effluent
3. Evidence of Equipment Failure
4. Unapproved Modification or Temporary Repair
5. Evidence of Process Upset
6. Other (explain in comments)

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INSPECTION OVERVIEW AND CONDITION OF TREATMENT UNITS

Water

Preliminary treatment

- Pre-aeration - to remove odor from influent. Odiferous air is passed through scrubbers and neutralized. Mr. Litzinger said that they had no odor complaints this year.
- Raw influent flow from pre-aeration to screening is measured by a venturi flow meter.
- Grit removal - 4 vortex grit chambers, 2 with Pista© grit and 2 with EIMCO Jeta 900 grit removal. Operators are running water through without running the grit removal equipment in order to see how much accumulates in the grit chamber basin.
- Three aerated EQ basins/tanks – two 2MG capacity, one 4MG capacity. EQ basin #1 was in service for diurnal flow equalization, EQ#3 was being drained for cleaning. EQ#2, the 4MG basin, is kept in reserve.
- Raw influent, filter backwash, and centrate combines prior to flow measurement of flow actually entering the plant at the influent metering station. The influent composite sample is collected from the 36" line to clarifiers 1-4, prior to any chemical addition.
- A separate line provides flow to the new clarifier #5. Each line has its own venturi flow meter; the flows are added to calculate the total primary flow when clarifier #5 is in use. The total primary flow is used in calculations for downstream flow-paced chemical additions. The feed line to Clarifier #5 is currently un-used.

Primary Treatment

- Four primary clarifiers are grouped together around a common splitter box. Clarifier #5 is new with the plant expansion and is completely separate from the other four. It can also be utilized as a gravity thickener.
- The walls of the splitter box used to distribute flow between clarifiers 1-4 were raised as part of the plant expansion. This allows the flow gates to be raised enough to allow flow into clarifier #5 when desired.
- Each clarifier has sludge and sump pumps (one employee has taken upon self to get all painted and looking good). Scum is sent to the scum tank and is eventually incinerated.

Secondary Treatment

- Primary effluent goes to one of two splitter boxes that feed into the in-service BNR aeration basins.
- Basin #2 flow runs opposite from the other four basins. Basin #2 was out of service.
- The BNR basins are currently configured with three anoxic zones followed by a swing zone and most of the rest are aerated. Methanol is added to the final anoxic zone.
- No ferric is being added to secondary treatment at this time; Mr. Litzinger stated that they are getting biological removal of phosphorous, so they don't need to add the chemicals.
- BNR basin #3 is tied in to secondary clarifier #3, and RAS is returned to Basin #3. For all other clarifiers, RAS is returned to the RAS splitter box and distributed between the other on-line basins.
- Secondary clarifiers - Preventative maintenance is done on center wells and scum troughs weekly. Weirs are covered to prevent algae growth/buildup, cleaned every month or two.
- Secondary clarifier effluent flows into the Final Filters Influent Diversion Chamber to be distributed to the Denitrification filters in service.

Tertiary treatment

- No methanol is being added to the Denitrification filters. Mr. Litzinger stated that they currently don't need to run the filters for Denitrification, and are using as regular sand filters. 24 filters (14 south Denite filters are new, 10 north Denite filters existed), 18 on line, reducing to goal of 14. Currently each backwashed every 9 days (2 per day/ night). When get to 14 on line will backwash every 7 days.

- Water in the filters was clear, but there was significant algae growth. Mr. Litzinger pointed out two filters that they have put covers over to evaluate how this would affect algae. Algae growth in the covered filters is much reduced, and staff is investigating covering all filters.

- The facility has three channels, two were in use. Each channel has 20 racks w/ 8 bulbs each, run at 100%. Burned out bulbs are changed weekly, the banks are cleaned at the same time. The auto wiper system on the sleeves is cleaned quarterly; the system receives an annual overhaul.

Solids

- Secondary clarifiers - clarifier # 3 RAS is returned to Basin #3 – remaining RAS is returned to splitter box.

- The four gravity thickeners are covered for odor control. The thickeners receive solids from the primary clarifiers, WAS from the secondary clarifiers, and may receive scum from both sets of clarifiers and from the BNR basins.

- Thickened sludge is sent to sludge storage tanks, where lime is added. Polymer is added as sludge is fed to the centrifuge.

- Three centrifuges - run one at a time. Dewatered sludge drops into hoppers, and is pumped into the incinerator via hydraulic rams.

- The Fluidized Bed Incinerator (FBI) is usually run at night. Operators start the run around 7:00pm and are done by 12:00 the following day. The incinerator uses natural gas to 1250 degrees Fahrenheit, then fuel oil is used to increase to the operating temperature of 1500 -1550 deg F.

- Sludge enters from the bottom and is drawn upwards. Residual water evaporates, organic matter incinerates. Operators can process 6000 – 9500 pounds per hour.

- Ash from the incineration process is removed by a wet scrubber system and becomes a slurry, which is sent to one of three ash basins. Ash settles out, water is drawn off and returned to the plant waste pump station.

- The ash basin overflow is discharged to the effluent trench drain and flows by gravity back to the Plant Wastewater Pump Station.

- Once water is gone, ash moved w/ front end loader to covered concrete pad, where it finishes drying and eventually hauled to landfill.

- The plant's older multiple hearth incinerator remains on site. This incinerator has not been used in about eight years; it was decommissioned because the process generates cyanide while in use, which kills off the plant bugs.

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LABORATORY INSPECTION

PRESENT DURING INSPECTION: **Mike Lawson; Robert Litzinger- H.L. Mooney WRF**

1. Do lab records include sampling date/time, analysis date/time, sample location, test method, test results, analyst's initials, instrument calibration and maintenance, and Certificate of Analysis?
   - ☑ Sampling Date/Time ☑ Analysis Date/Time ☑ Sample Location ☑ Test Method ☑ Test Results
   - ☑ Analyst's Initials ☑ Instrument Calibration & Maintenance
   - ☐ Chain of Custody ☐ Certificate of Analysis

2.	Are Discharge Monitoring Reports complete and correct? Month(s) reviewed: September 2012	☑ Yes	☐ No
3.	Are sample location(s) according to permit requirements (after all treatment unless otherwise specified)?	☑ Yes	☐ No
4.	Are sample collection, preservation, and holding times appropriate; and is sampling equipment adequate?	☑ Yes	☐ No
5.	Are grab and composite samples representative of the flow and the nature of the monitored activity?	☑ Yes	☐ No
6.	If analysis is performed at another location, are shipping procedures adequate? List parameters and name & address of contract lab(s): **NA - Analyses are performed in on-site VELAP accredited laboratory** **Lab ID 460012**	☐ Yes	☐ No
7.	Are annual thermometer calibration(s) adequate?	☑ Yes	☐ No

8. Parameters evaluated during this inspection (attach checklists):
   - ☑ pH
   - ☐ Temperature
   - ☐ Total Residual Chlorine
   - ☑ Dissolved Oxygen
   - ☐ ~~Biochemical Oxygen Demand~~
   - ☐ ~~Total Suspended Solids~~
   - ☐ Other (specify)
   - ☐ Other (specify)
   - ☐ Other (specify)

   Comments:

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EFFLUENT FIELD DATA:

Flow MGD	**Dissolved Oxygen** 7.9 mg/L	**TRC (Contact Tank)** mg/L
pH 7.08 S.U.	**Temperature** °C	**TRC (Final Effluent)** mg/L
Was a Sampling Inspection conducted?	☐ Yes (see Sampling Inspection Report) ☐ No	

CONDITION OF OUTFALL AND EFFLUENT CHARACTERISTICS:

1. Type of outfall: ☑ Shore based ☐ Submerged Diffuser? ☐ Yes ☐ No
2. Are the outfall and supporting structures in good condition? ☑ Yes ☐ No
3. Final Effluent (evidence of following problems): ☐ Sludge bar ☐ Grease ☐ Turbid effluent ☐ Visible foam ☐ Unusual color ☐ Oil sheen
4. Is there a visible effluent plume in the receiving stream? ☐ Yes ☑ No
5. Receiving stream: ☑ No observed problems ☐ Indication of problems (explain below)
   Comments:

REQUEST for CORRETIVE ACTION:

1. None at this time.

NOTES and COMMENTS:

- See Inspection Summary at front of report.

ANALYST:	**Mike Lawson**	VPDES NO	**VA0025101**

Parameter: Hydrogen Ion (pH)
Method: Electrometric
01/08

Meter: **Accumet AB15**

METHOD OF ANALYSIS

X	18th Edition of Standard Methods-4500-H-B
	21st or On-Line Edition of Standard Methods-4500-H-B (00)

	pH is a method defined analyte so modifications are not allowed. [40 CFR Part 136.6]	Y	N
1)	Is a certificate of operator competence or initial demonstration of capability available for each analyst/operator performing the analysis? **NOTE:** Analyze 4 samples of known pH. May use external source of buffer (different lot/manufacturer than buffers used to calibrate meter). Recovery for each of the 4 samples must be ± 0.1 SU of the known concentration of the sample. [SM 1020 B.1]	X	
2)	Is the electrode in good condition (no chloride precipitate, etc.)? [2.b/c and 5.b]	X	
3)	Is electrode storage solution in accordance with manufacturer's instructions? [Mfr.]	X	
4)	Is meter calibrated on at least a daily basis using three buffers all of which are at the same temperature? [4.a] NOTE: Follow manufacturer's instructions.	X	
5)	After calibration, is a buffer analyzed as a check sample to verify that calibration is correct? Agreement should by within ± 0.1 SU. [4.a]	X	
6)	Do the buffer solutions appear to be free of contamination or growths? [3.1]	X	
7)	Are buffer solutions within their listed shelf life or have they been prepared within the last 4 weeks? [3.a]	X	
8)	Is the cap or sleeve covering the access hole on the reference electrode removed when measuring pH? [Mfr.]	X	
9)	For meters with ATC that also have temperature display, was the thermometer calibrated annually? [SM2550 B.1]	X	
10)	Is the temperature of buffer solutions and samples recorded when determining pH? [4.a]	X	
11)	Is sample analyzed within 15 minutes of collection? [40 CFR 136.6]	X	
12)	Was the electrode rinsed and then blotted dry between reading solutions (Disregard if a portion of the next sample analyzed is used as the rinse solution)? [4.a]	X	
13)	Is the sample stirred gently at a constant speed during measurement? [4.b]	X	
14)	Does the meter hold a steady reading after reaching equilibrium? [4.b]	X	
15)	~~Is a duplicate sample analyzed after every 20 samples if citing 18th or 19th Edition [1020 B.6] or after every 10 samples for 20th or 21st Edition [Part 1020] Note: Not required for *in situ* samples.~~	NA	
16)	~~Is pH of duplicate samples within 0.1 SU of the original sample? [Part 1020]~~		
17)	~~Is there a written procedure for which result will be reported on DMR (Sample or Duplicate) and is this procedure followed? [DEQ]~~		

COMMENTS:	**4, 5) Calibrated with 4 and 7 buffer, checked with a 10 buffer** **11) Because pH changes as temperature changes, the operator's log sheet should be modified to include the temperature of the sample at the time the pH is read.**
PROBLEMS:	**None noted.**

ANALYST:	**Mike Lawson**	VPDES NO.	**VA0025101**

Parameter: Dissolved Oxygen
Method: Electrode
01/08

Meter: **YSI 58**

METHOD OF ANALYSIS:

X	18th Edition of Standard Methods-4500-O G
	21st or Online Editions of Standard Methods-4500-O G (01)

	DO is a method defined analyte so modifications are not allowed. [40 CFR Part 136.6]	**Y**	**N**
1)	If samples are collected, is collection carried out with a minimum of turbulence and air bubble formation and is the sample bottle allowed to overflow several times its volume? [B.3]	**In situ**	
2)	Are meter and electrode operable and providing consistent readings? [3]	**X**	
3)	Is membrane in good condition without trapped air bubbles? [3.b]	**X**	
4)	Is correct filling solution used in electrode? [Mfr.]	**X**	
5)	Are water droplets shaken off the membrane prior to calibration? [Mfr.]	**X**	
6)	Is meter calibrated before use or at least daily? [Mfr.]	**X**	
7)	Is calibration procedure performed according to manufacturer's instructions? [Mfr.]	**X**	
8)	Is sample stirred during analysis? [Mfr.]	**In situ**	
9)	Is the sample analysis procedure performed according to manufacturer's instructions? [Mfr.]	**X**	
10)	Is meter stabilized before reading D.O.? [Mfr.]	**X**	
11)	Is electrode stored according to manufacturer's instructions? [Mfr.]	**X**	
12)	~~Is a duplicate sample analyzed after every 20 samples if citing 18th or 19th Edition [1020 B.6] or after every 10 samples for 20th or 21st Edition [Part 1020] Note: Not required for *in situ* samples.~~	**NA**	
13)	~~If a duplicate sample is analyzed, is the reported value for that sampling event, the average concentration of the sample and the duplicate? [DEQ]~~		
14)	~~If a duplicate sample is analyzed, is the relative percent difference (RPD) < 20? [18th ed. Table 1020 I; 21st ed. DEQ]~~		

PROBLEMS:	**None Noted**

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
EQUIPMENT TEMPERATURE LOG/THERMOMETER VERIFICATION CHECK SHEET

1/08

FACILITY NAME:	H.L. Mooney WRF	VPDES NO:	VA0025101	DATE:	September 21, 2012

EQUIPMENT	RANGE	IN RANGE		INSPECT READING °C	CHECK & LOG DAILY		CORRECT INCREMENT		ANNUAL THERMOMETER VERIFICATION				
									Is the NIST / NIST-Traceable Reference Thermometer within the manufacturer's expiration date or recertified yearly?			Y/N	Y
									DATE CHECKED	MARKED		CORR FACTOR	INSPECT TEMP
		Y	N		Y	N	Y	N		Y	N	°C	°C
AUTO SAMPLER	1-6° C			**3.1**	**X**		**X**		**8-7-12**	**X**		**-0.2**	**3.0**
pH METER	± 1° C			**Not noted**					**8-7-12**	**X**		**0**	**29.7**
DO METER	± 1° C			**Not noted**					**8-7-12**	**X**		**+0.3**	**20**

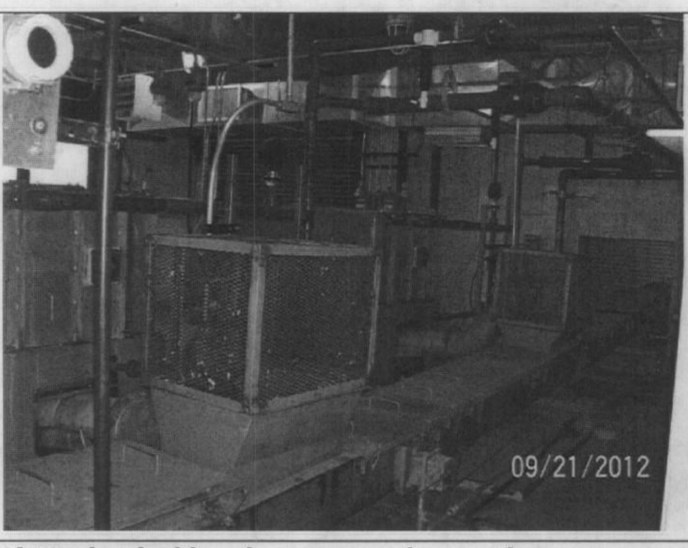
PROBLEMS:	**None noted**

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
SAMPLE ANALYSIS HOLDING TIME/CONTAINER/PRESERVATION CHECK SHEET

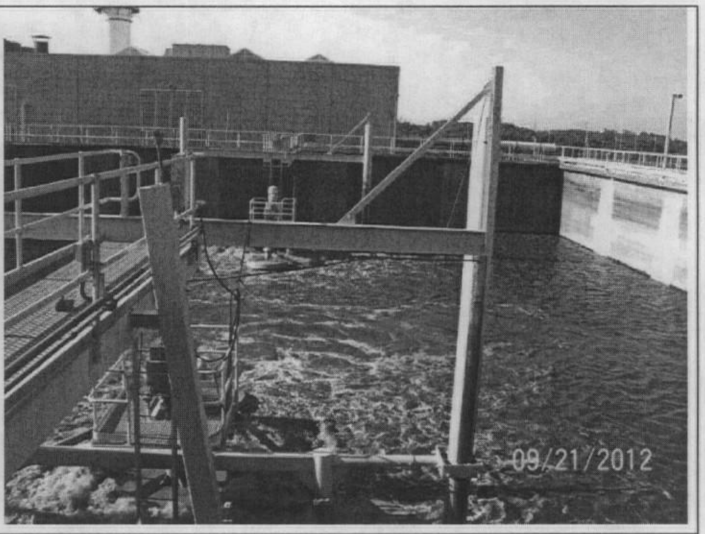
Revised 7/05 [40 CFR, Part 136.3, Table II]

FACILITY NAME:	H.L. Mooney RWF	VPDES NO	VA0025101	DATE:	September 20, 2012

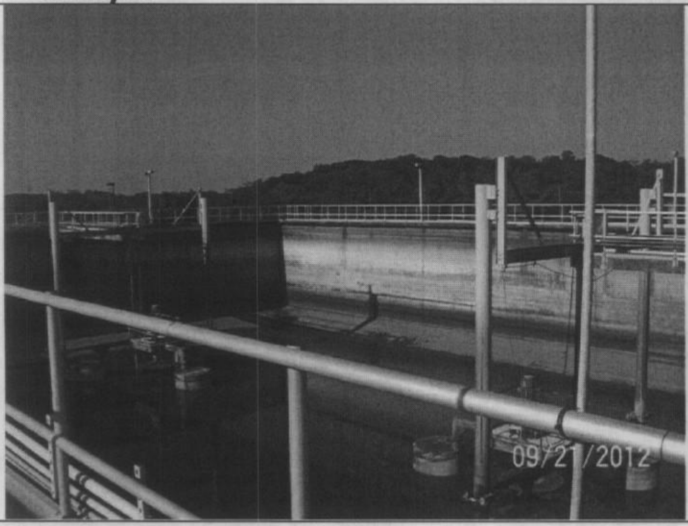
HOLDING TIMES						SAMPLE CONTAINER				PRESERVATION				
PARAMETER	APPROVED	MET?		LOGGED?		ADEQ. VOLUME		APPROP. TYPE		APPROVED	MET?		CHECKED?	
		Y	N	Y	N	Y	N	Y	N		Y	N	Y	N
pH	15 MIN.	**X**		**X**		**X**		**X**		N/A				
DISSOLVED O_2	15 MIN./IN SITU	**X**		**X**		**In Situ**		**In Situ**		N/A				
PROBLEMS: **None noted**										PROBLEMS: **N/A**				



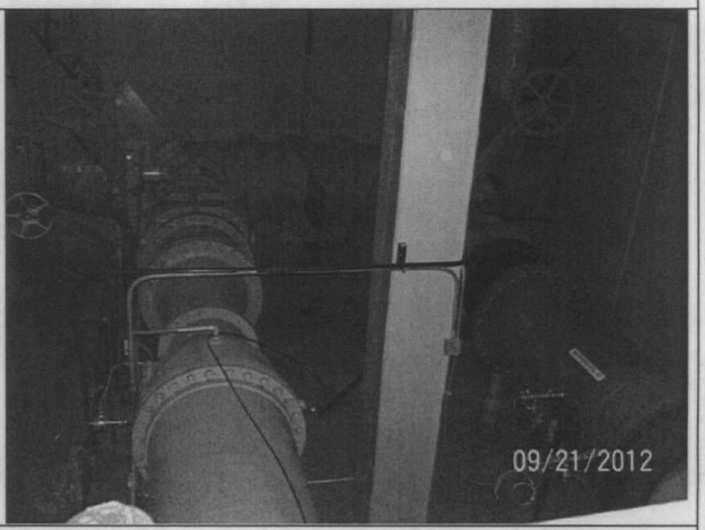
1) Mechanical band screens and screenings conveyor.



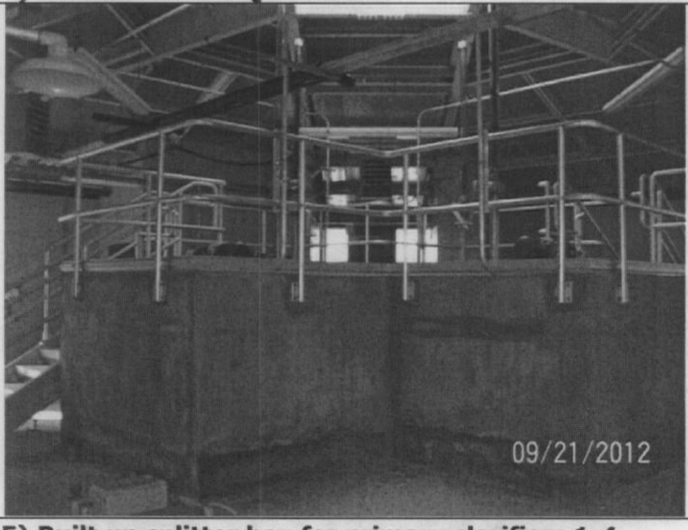
2) EQ basin #1.



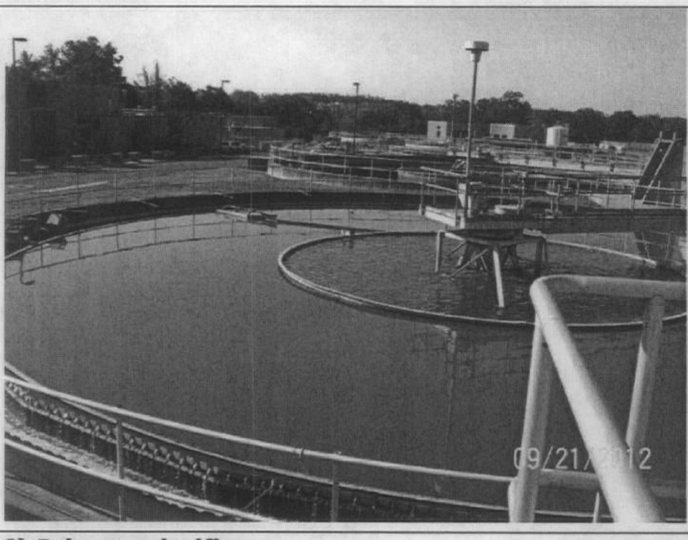
3) Drained down EQ basin #3.



4) Flow measurement at influent metering station.



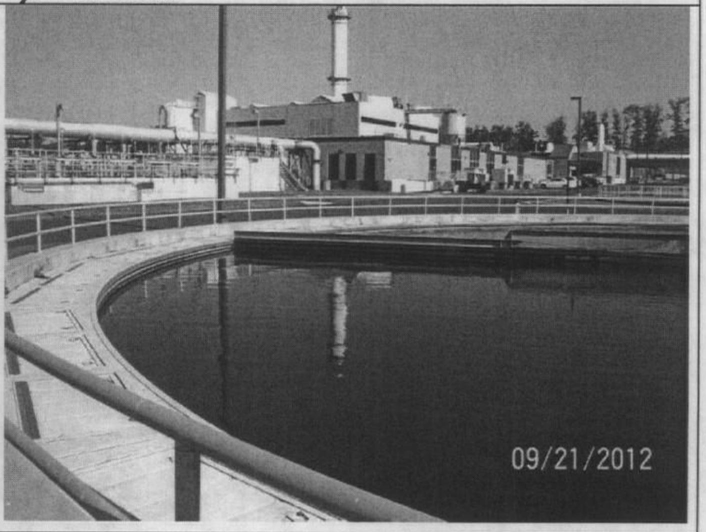
5) Built up splitter box for primary clarifiers 1-4.



6) Primary clarifier.

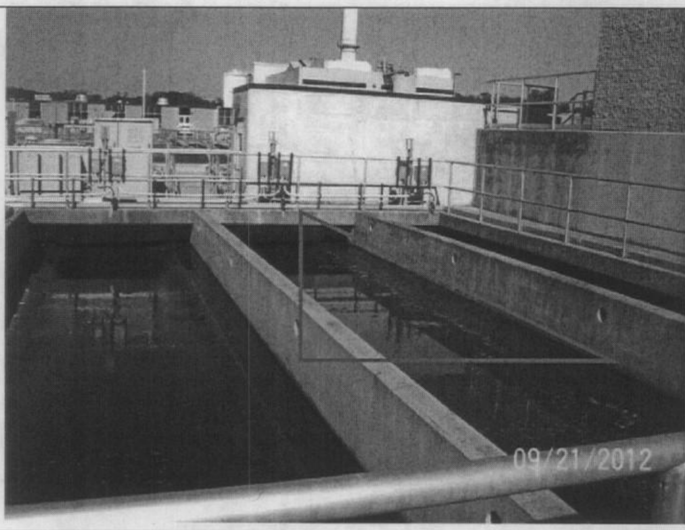
7) BNR basin.

8) Empty BNR basin #2 showing zone dividers.



9) Secondary clarifier.

10) Secondary clarifier weirs.



11) Denitrification filters.

12) Step aeration.

13) Covered gravity thickeners and odor control.

14) Dewatering centrifuges.

To:	Alison Thompson
From:	Jennifer Carlson
Date:	March 14, 2014
Subject:	Planning Statement for HL Mooney Advanced Water Reclamation Facility
Permit Number:	VA0025101

Information for Outfall 001:

Discharge Type:	Municipal
Discharge Flow:	24 MGD
Receiving Stream:	Neabsco Creek
Latitude / Longitude:	38º 36' 39", 77º 16' 13"
Rivermile:	1.57
Streamcode:	1aNEA
Waterbody:	VAN-A25E
Water Quality Standards:	Class II, Section 6, Special Standards b, y
Drainage Area:	Not Applicable - tidal

1. Please provide water quality monitoring information for the receiving stream segment. If there is not monitoring information for the receiving stream segment, please provide information on the nearest downstream monitoring station, including how far downstream the monitoring station is from the outfall.

   This facility discharges into a segment of tidal Neabsco Creek that is not currently monitored by DEQ, but is listed with a water quality impairment. The following is the water quality summary for the receiving stream segment of tidal Neabsco Creek, as taken from the 2012 Integrated Report:

   The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory. A PCB TMDL for the tidal Potomac River watershed has been completed and approved.

   The aquatic life use is fully supporting. A TMDL has been completed for the Chesapeake Bay watershed. This downstream TMDL completed by EPA addresses the poor water quality in the Chesapeake Bay, and takes into account the entire Bay watershed including upstream tidal tributaries such as Neabsco Creek. The submerged aquatic vegetation data is assessed as fully supporting the aquatic life use. For the open water aquatic life subuse; the thirty day mean is acceptable, however, the seven day mean and instantaneous levels have not been assessed.

   The recreation and wildlife uses were not assessed.

   There is a downstream DEQ ambient monitoring station, 1aNEA000.57, located in Neabsco Bay at the railroad bridge, approximately 1 mile downstream of Outfall 001. The following is the water quality summary for Neabsco Bay, as taken from the 2012 Integrated Report:

   Class II, Section 6, special stds. b, y.

   DEQ monitoring stations located in Neabsco Bay:

- *Ambient water quality monitoring station 1aNEA000.40, near Marker 3/4*
- *Fish tissue, water quality, and continuous monitoring station 1aNEA000.57, at railroad bridge*

The fish consumption use is categorized as impaired due to a Virginia Department of Health, Division of Health Hazards Control, PCB fish consumption advisory and sufficient excursions above the fish tissue value (TV) for PCBs in fish tissue. Additionally, an excursion above the fish tissue value (TV) of 300 parts per billion (ppb) for mercury (Hg) in fish tissue was recorded in one species of fish (1 total samples) collected in 2008 at monitoring station 1aNEA000.57 (bluegill sunfish) is noted by an observed effect. A PCB TMDL for the tidal Potomac River watershed has been completed and approved.

E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use.

The aquatic life use is fully supporting. A TMDL has been completed for the Chesapeake Bay watershed. This downstream TMDL completed by EPA addresses the poor water quality in the Chesapeake Bay, and takes into account the entire Bay watershed including upstream tidal tributaries such as Neabsco Creek. The submerged aquatic vegetation data is assessed as fully supporting the aquatic life use. For the open water aquatic life subuse; the thirty day mean is acceptable, however, the seven day mean and instantaneous levels have not been assessed.

The wildlife use is considered fully supporting.

2. Does this facility discharge to a stream segment on the 303(d) list? If yes, please fill out Table A.

Yes.

Table A. 303(d) Impairment and TMDL information for the receiving stream segment

Waterbody Name	Impaired Use	Cause	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the 2012 Integrated Report						
Neabsco Creek	Fish Consumption	PCBs	Tidal Potomac River PCB 10/31/2007	2.12 grams/year PCB	0.064 ng/L PCB --- 24 MGD	N/A

3. Are there any downstream 303(d) listed impairments that are relevant to this discharge? If yes, please fill out Table B.

Yes.

Table B. Information on Downstream 303(d) Impairments and TMDLs

Waterbody Name	Impaired Use	Cause	Distance From Outfall	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the 2012 Integrated Report							
Neabsco Bay	Recreation	*E. coli*	0.25 miles	No	---	---	2016
Chesapeake Bay	Aquatic Life	Total Nitrogen	---	Chesapeake Bay TMDL 12/29/2010	219,280 lbs/yr TN	Edge of Stream (EOS) Loads	N/A
		Total Phosphorus			13,157 lbs/yr TP		
		Total Suspended Solids			2,192,803.2 lbs/yr TSS		

4. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

   The tidal Potomac River is listed with a PCB impairment and a TMDL has been developed to address this impairment. This facility has been included in the Tidal Potomac River PCB TMDL and has received a WLA. This facility conducted PCB monitoring during the last permit cycle in support of the PCB TMDL. The PCB monitoring data will be evaluated, and source reductions through pollution minimization plans may be needed.

5. Fact Sheet Requirements – Please provide information regarding any drinking water intakes located within a 5 mile radius of the discharge point.

   There are no public water supply intakes located within 5 miles of this discharge.

Dissolved Oxygen Criteria (9 VAC 25-260-185)

Designated Use	Criteria Concentration/Duration	Temporal Application
Migratory fish spawning and nursery	7-day mean > 6 mg/L (tidal habitats with 0-0.5 ppt salinity)	February 1 – May 31
	Instantaneous minimum > 5 mg/L	
Open-water[1,2]	30-day mean > 5.5 mg/L (tidal habitats with 0-0.5 ppt salinity) 30-day mean > 5 mg/L (tidal habitats with >0.5 ppt salinity)	Year-round
	7-day mean > 4 mg/L	
	Instantaneous minimum > 3.2 mg/L at temperatures < 29°C Instantaneous minimum > 4.3 mg/L at temperatures > 29°C	
Deep-water	30-day mean >3 mg/L	June 1-September 30
	1-day mean > 2.3 mg/L	
	Instantaneous minimum > 1.7 mg/L	
Deep-channel	Instantaneous minimum > 1 mg/L	June 1-September 30

[1]See subsection aa of 9 VAC 25-260-310 for site specific seasonal open-water dissolved oxygen criteria applicable to the tidal Mattaponi and Pamunkey Rivers and their tidal tributaries.

[2]In applying this open-water instantaneous criterion to the Chesapeake Bay and its tidal tributaries where the existing water quality for dissolved oxygen exceeds an instantaneous minimum of 3.2 mg/L, that higher water quality for dissolved oxygen shall be provided antidegradation protection in accordance with section 30 subsection A.2 of the Water Quality Standards.

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: HL Mooney WRF

Permit No.: VA0025101

Receiving Stream: Neabsco Creek (November-January)

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	105.9 mg/L
90% Temperature (Annual) =	deg C
90% Temperature (Wet season) =	deg C
90% Maximum pH =	SU
10% Maximum pH =	SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	n

Stream Flows

1Q10 (Annual) =	0 MGD
7Q10 (Annual) =	0 MGD
30Q10 (Annual) =	0 MGD
1Q10 (Wet season) =	0 MGD
30Q10 (Wet season)	0 MGD
30Q5 =	0 MGD
Harmonic Mean =	0 MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	121 mg/L
90% Temp (Annual) =	deg C
90% Temp (Wet season) =	11.6 deg C
90% Maximum pH =	8 SU
10% Maximum pH =	SU
Discharge Flow =	24 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	--	--	na	**9.9E+02**
Acrolein	0	--	--	na	9.3E+00	--	--	na	9.3E+00	--	--	--	--	--	--	--	--	--	--	na	**9.3E+00**
Acrylonitrile[c]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	na	**2.5E+00**
Aldrin [c]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	-					**3.0E+00**	--	na	**5.0E-04**
Ammonia-N (mg/l) (Yearly)	0	8.41E+00	3.95E+00	na	--	8.41E+00	3.95E+00	na	--	--	--	--	-					**8.41E+00**	**3.95E+00**	na	--
Ammonia-N (mg/l) (High Flow)	0	8.41E+00	2.94E+00	na	--	8.41E+00	2.94E+00	na	--	--	--	--	-					**8.41E+00**	**2.94E+00**	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.0E+04	--	--	--	-					--	--	na	**4.0E+04**
Antimony	0	--	--	na	6.4E+02	--	--	na	6.4E+02	--	--	--	-					--	--	na	**6.4E+02**
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	-					**3.4E+02**	**1.5E+02**	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	-					--	--	na	--
Benzene [c]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	-					--	--	na	**5.1E+02**
Benzidine[c]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	-					--	--	na	**2.0E-03**
Benzo (a) anthracene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	**1.8E-01**
Benzo (b) fluoranthene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	**1.8E-01**
Benzo (k) fluoranthene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	**1.8E-01**
Benzo (a) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	**1.8E-01**
Bis2-Chloroethyl Ether [c]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	--	--	na	**5.3E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	6.5E+04	--	--	--	--	--	--	--	--	--	--	na	**6.5E+04**
Bis 2-Ethylhexyl Phthalate [c]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	--	--	na	**2.2E+01**
Bromoform [c]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	**1.4E+03**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	**1.9E+03**
Cadmium	0	4.9E+00	1.3E+00	na	--	4.9E+00	1.3E+00	na	--	--	--	--	--	--	--	--	--	**4.9E+00**	**1.3E+00**	na	--
Carbon Tetrachloride [c]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	**1.6E+01**
Chlordane [c]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.3E-03	na	8.1E-03	--	--	--	--	--	--	--	--	**2.4E+00**	**4.3E-03**	na	**8.1E-03**
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	**8.6E+05**	**2.3E+05**	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.1E+01**	na	--
Chlorobenzene					1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	**1.6E+03**

WLAs

8.41 × 3.76 = 31.62

2.94 × 3.76 = 11.05

Attachment 7

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.3E+02**
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	**na**	**1.1E+04**
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.6E+03**
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.5E+02**
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	**8.3E-02**	**4.1E-02**	**na**	--
Chromium III	0	6.7E+02	8.7E+01	na	--	6.7E+02	8.7E+01	na	--	--	--	--	--	--	--	--	--	**6.7E+02**	**8.7E+01**	**na**	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.1E+01**	**na**	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-02**
Copper	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.6E+01**	**1.1E+01**	**na**	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.2E+00	na	1.6E+04	--	--	--	--	--	--	--	--	**2.2E+01**	**5.2E+00**	**na**	**1.6E+04**
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	**na**	**3.1E-03**
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	**na**	**2.2E-03**
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.2E-03	--	--	--	--	--	--	--	--	**1.1E+00**	**1.0E-03**	**na**	**2.2E-03**
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	**1.0E-01**	**na**	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	**1.7E-01**	**1.7E-01**	**na**	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.3E+03**
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	9.6E+02	--	--	--	--	--	--	--	--	--	--	**na**	**9.6E+02**
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.9E+02**
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**2.8E-01**
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.7E+02**
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	**na**	**3.7E+02**
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.1E+03	--	--	--	--	--	--	--	--	--	--	**na**	**7.1E+03**
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	**na**	**1.0E+04**
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	2.9E+02	--	--	--	--	--	--	--	--	--	--	**na**	**2.9E+02**
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.5E+02**
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	--	--	**na**	**2.1E+02**
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.6E-02	na	5.4E-04	--	--	--	--	--	--	--	--	**2.4E-01**	**5.6E-02**	**na**	**5.4E-04**
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.4E+04	--	--	--	--	--	--	--	--	--	--	**na**	**4.4E+04**
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	8.5E+02	--	--	--	--	--	--	--	--	--	--	**na**	**8.5E+02**
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	**na**	**1.1E+06**
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.5E+03	--	--	--	--	--	--	--	--	--	--	**na**	**4.5E+03**
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	**na**	**5.3E+03**
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	2.8E+02	--	--	--	--	--	--	--	--	--	--	**na**	**2.8E+02**
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**3.4E+01**
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.1E-08	--	--	--	--	--	--	--	--	--	--	**na**	**5.1E-08**
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	--	--	**na**	**2.0E+00**
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**8.9E+01**
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	**na**	**8.9E+01**
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	--	--	--	--	--	--	--	--	**2.2E-01**	**5.6E-02**	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	--	--	**na**	**8.9E+01**
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.6E-02	na	6.0E-02	--	--	--	--	--	--	--	--	**8.6E-02**	**3.6E-02**	**na**	**6.0E-02**
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	--	--	**na**	**3.0E-01**

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.1E+03	--	--	--	--	--	--	--	--	--	--	na	2.1E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	na	5.3E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	1.0E-02	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.8E-03	na	7.9E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	7.9E-04
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.8E-03	na	3.9E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	3.9E-04
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	--	--	na	2.9E-03
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	--	--	na	4.9E-02
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	--	--	na	1.7E-01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	9.5E-01	--	na	1.8E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	na	3.3E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	2.0E+00	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	na	9.6E+03
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	1.5E+02	1.7E+01	na	--	1.5E+02	1.7E+01	na	--	--	--	--	--	--	--	--	--	1.5E+02	1.7E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	- -	- -	1.4E+00	7.7E-01	- -	- -	--	--	--	--	--	--	--	--	1.4E+00	7.7E-01	- -	- -
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	--	--	na	5.9E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	--	3.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	2.1E+02	2.4E+01	na	4.6E+03	2.1E+02	2.4E+01	na	4.6E+03	--	--	--	--	--	--	--	--	2.1E+02	2.4E+01	na	4.6E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	6.9E+02	--	--	--	--	--	--	--	--	--	--	na	6.9E+02
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	--	--	na	3.0E+01
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	--	--	na	5.1E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	na	--	--	--	--	--	--	--	--	--	2.8E+01	6.6E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	6.5E-02	1.3E-02	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.4E-04	--	--	--	--	--	--	--	--	--	1.4E-02	na	6.4E-04
Pentachlorophenol [C]	0	7.7E-03	5.9E-03	na	3.0E+01	7.7E-03	5.9E-03	na	3.0E+01	--	--	--	--	--	--	--	--	7.7E-03	5.9E-03	na	3.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	8.6E+05	--	--	--	--	--	--	--	--	--	--	na	8.6E+05
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	--	--	na	4.0E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.0E+00	na	4.2E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**4.2E+03**
Silver	0	4.8E+00	--	na	--	4.8E+00	--	na	--	--	--	--	--	--	--	--	--	**4.8E+00**	--	**na**	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
1,1,2,2-Tetrachloroethane^{C}	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	--	--	**na**	**4.0E+01**
Tetrachloroethylene^{C}	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	4.7E-01	--	--	--	--	--	--	--	--	--	--	**na**	**4.7E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.0E+03	--	--	--	--	--	--	--	--	--	--	**na**	**6.0E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Toxaphene ^{C}	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.2E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.2E-02**	**na**	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.0E+01	--	--	--	--	--	--	--	--	--	--	**na**	**7.0E+01**
1,1,2-Trichloroethane^{C}	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.6E+02**
Trichloroethylene ^{C}	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	**na**	**3.0E+02**
2,4,6-Trichlorophenol ^{C}	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Vinyl Chloride^{C}	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.4E+01**
Zinc	0	1.4E+02	1.4E+02	na	2.6E+04	1.4E+02	1.4E+02	na	2.6E+04	--	--	--	--	--	--	--	--	**1.4E+02**	**1.4E+02**	**na**	**2.6E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.4E+02
Arsenic	9.0E+01
Barium	na
Cadmium	7.9E-01
Chromium III	5.2E+01
Chromium VI	6.4E+00
Copper	6.3E+00
Iron	na
Lead	1.0E+01
Manganese	na
Mercury	4.6E-01
Nickel	1.4E+01
Selenium	3.0E+00
Silver	1.9E+00
Zinc	5.5E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: HL Mooney WRF   Permit No.: VA0025101

Receiving Stream: Neabsco Creek (February - March)   Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	105.9 mg/L	1Q10 (Annual) =	0 MGD	Annual - 1Q10 Mix =	100 %	Mean Hardness (as CaCO3) =	121 mg/L
90% Temperature (Annual) =	deg C	7Q10 (Annual) =	0 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	deg C
90% Temperature (Wet season) =	deg C	30Q10 (Annual) =	0 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	10.4 deg C
90% Maximum pH =	SU	1Q10 (Wet season) =	0 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	8.42 SU
10% Maximum pH =	SU	30Q10 (Wet season)	0 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	SU
Tier Designation (1 or 2) =	1	30Q5 =	0 MGD			Discharge Flow =	24 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	0 MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	--	--	**na**	**9.9E+02**
Acrolein	0	--	--	na	9.3E+00	--	--	na	9.3E+00	--	--	--	--	--	--	--	--	--	--	**na**	**9.3E+00**
Acrylonitrile C	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	**na**	**2.5E+00**
Aldrin C	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--					**3.0E+00**	--	**na**	**5.0E-04**
Ammonia-N (mg/l) (Yearly)	0	3.74E+00	1.25E+00	na	--	3.74E+00	1.25E+00	na	--	--	--	--	--					**3.74E+00**	**1.25E+00**	**na**	--
Ammonia-N (mg/l) (High Flow)	0	3.74E+00	1.25E+00	na	--	3.74E+00	1.25E+00	na	--	--	--	--	--					**3.74E+00**	**1.25E+00**	**na**	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.0E+04	--	--	--	--					--	--	**na**	**4.0E+04**
Antimony	0	--	--	na	6.4E+02	--	--	na	6.4E+02	--	--	--	--					--	--	**na**	**6.4E+02**
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--					**3.4E+02**	**1.5E+02**	**na**	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--					--	--	**na**	--
Benzene C	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	--					--	--	**na**	**5.1E+02**
Benzidine C	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--	--					--	--	**na**	**2.0E-03**
Benzo (a) anthracene C	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Benzo (b) fluoranthene C	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Benzo (k) fluoranthene C	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Benzo (a) pyrene C	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Bis2-Chloroethyl Ether C	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	--	--	**na**	**5.3E+00**
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	6.5E+04	--	--	--	--	--	--	--	--	--	--	**na**	**6.5E+04**
Bis 2-Ethylhexyl Phthalate C	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.2E+01**
Bromoform C	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.4E+03**
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.9E+03**
Cadmium	0	4.9E+00	1.3E+00	na	--	4.9E+00	1.3E+00	na	--	--	--	--	--	--	--	--	--	**4.9E+00**	**1.3E+00**	**na**	--
Carbon Tetrachloride C	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	**na**	**1.6E+01**
Chlordane C	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.3E-03	na	8.1E-03	--	--	--	--	--	--	--	--	**2.4E+00**	**4.3E-03**	**na**	**8.1E-03**
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	**8.6E+05**	**2.3E+05**	**na**	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.1E+01**	**na**	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.6E+03**

WLAs

3.74 × 3.61 = 13.5

1.25 × 3.61 = 4.51

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Chlorodibromomethane[c]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	1.3E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	8.3E-02	4.1E-02	na	--
Chromium III	0	6.7E+02	8.7E+01	na	--	6.7E+02	8.7E+01	na	--	--	--	--	--	--	--	--	--	6.7E+02	8.7E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [c]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	--	--	na	1.8E-02
Copper	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.2E+00	na	1.6E+04	--	--	--	--	--	--	--	--	2.2E+01	5.2E+00	na	1.6E+04
DDD [c]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	3.1E-03
DDE [c]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	2.2E-03
DDT [c]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.2E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	na	2.2E-03
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	1.7E-01	1.7E-01	na	--
Dibenz(a,h)anthracene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	na	1.3E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	9.6E+02	--	--	--	--	--	--	--	--	--	--	na	9.6E+02
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	--	--	na	1.9E+02
3,3-Dichlorobenzidine[c]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	--	--	na	2.8E-01
Dichlorobromomethane [c]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	na	1.7E+02
1,2-Dichloroethane [c]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	na	3.7E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.1E+03	--	--	--	--	--	--	--	--	--	--	na	7.1E+03
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	2.9E+02	--	--	--	--	--	--	--	--	--	--	na	2.9E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[c]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
1,3-Dichloropropene [c]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	--	--	na	2.1E+02
Dieldrin [c]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.6E-02	na	5.4E-04	--	--	--	--	--	--	--	--	2.4E-01	5.6E-02	na	5.4E-04
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.4E+04	--	--	--	--	--	--	--	--	--	--	na	4.4E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	8.5E+02	--	--	--	--	--	--	--	--	--	--	na	8.5E+02
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	1.1E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.5E+03	--	--	--	--	--	--	--	--	--	--	na	4.5E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	na	5.3E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	2.8E+02	--	--	--	--	--	--	--	--	--	--	na	2.8E+02
2,4-Dinitrotoluene [c]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	--	--	na	3.4E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.1E-08	--	--	--	--	--	--	--	--	--	--	na	5.1E-08
1,2-Diphenylhydrazine[c]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	--	--	na	2.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	8.9E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	8.9E+01
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	--	--	na	8.9E+01
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.6E-02	na	6.0E-02	--	--	--	--	--	--	--	--	8.6E-02	3.6E-02	na	6.0E-02
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	--	--	na	3.0E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.1E+03	--	--	--	--	--	--	--	--	--	--	**na**	**2.1E+03**
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.4E+02**
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	**na**	**5.3E+03**
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	**1.0E-02**	**na**	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.8E-03	na	7.9E-04	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**7.9E-04**
Heptachlor Epoxide [c]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.8E-03	na	3.9E-04	--	--	--	--	--	--	--	--	**5.2E-01**	**3.8E-03**	**na**	**3.9E-04**
Hexachlorobenzene [c]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	--	--	**na**	**2.9E-03**
Hexachlorobutadiene [c]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E+02**
Hexachlorocyclohexane Alpha-BHC [c]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	--	--	**na**	**4.9E-02**
Hexachlorocyclohexane Beta-BHC [c]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.7E-01**
Hexachlorocyclohexane Gamma-BHC [c] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	**9.5E-01**	--	**na**	**1.8E+00**
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.1E+03**
Hexachloroethane [c]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	**na**	**3.3E+01**
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	**2.0E+00**	**na**	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	**na**	**1.8E-01**
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Isophorone [c]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	**na**	**9.6E+03**
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	**0.0E+00**	**na**	--
Lead	0	1.5E+02	1.7E+01	na	--	1.5E+02	1.7E+01	na	--	--	--	--	--	--	--	--	--	**1.5E+02**	**1.7E+01**	**na**	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	**1.0E-01**	**na**	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	7.7E-01	--	--	--	--	--	--	--	--	--	--	**1.4E+00**	**7.7E-01**	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	**na**	**1.5E+03**
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	--	--	**na**	**5.9E+03**
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	--	**3.0E-02**	**na**	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	**0.0E+00**	**na**	--
Nickel	0	2.1E+02	2.4E+01	na	4.6E+03	2.1E+02	2.4E+01	na	4.6E+03	--	--	--	--	--	--	--	--	**2.1E+02**	**2.4E+01**	**na**	**4.6E+03**
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	6.9E+02	--	--	--	--	--	--	--	--	--	--	**na**	**6.9E+02**
N-Nitrosodimethylamine [c]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	--	--	**na**	**3.0E+01**
N-Nitrosodiphenylamine [c]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	**na**	**6.0E+01**
N-Nitrosodi-n-propylamine [c]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	--	--	**na**	**5.1E+00**
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	na	--	--	--	--	--	--	--	--	--	**2.8E+01**	**6.6E+00**	**na**	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	**6.5E-02**	**1.3E-02**	**na**	--
PCB Total [c]	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.4E-04	--	--	--	--	--	--	--	--	--	**1.4E-02**	**na**	**6.4E-04**
Pentachlorophenol [c]	0	7.7E-03	5.9E-03	na	3.0E+01	7.7E-03	5.9E-03	na	3.0E+01	--	--	--	--	--	--	--	--	**7.7E-03**	**5.9E-03**	**na**	**3.0E+01**
Phenol	0	--	--	na	8.6E+05	--	--	na	8.6E+05	--	--	--	--	--	--	--	--	--	--	**na**	**8.6E+05**
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	--	--	**na**	**4.0E+03**
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.0E+00	na	4.2E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**4.2E+03**
Silver	0	4.8E+00	--	na	--	4.8E+00	--	na	--	--	--	--	--	--	--	--	--	**4.8E+00**	--	**na**	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	--	--	**na**	**4.0E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	4.7E-01	--	--	--	--	--	--	--	--	--	--	**na**	**4.7E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.0E+03	--	--	--	--	--	--	--	--	--	--	**na**	**6.0E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.2E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.2E-02**	**na**	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.0E+01	--	--	--	--	--	--	--	--	--	--	**na**	**7.0E+01**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.6E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	**na**	**3.0E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.4E+01**
Zinc	0	1.4E+02	1.4E+02	na	2.6E+04	1.4E+02	1.4E+02	na	2.6E+04	--	--	--	--	--	--	--	--	**1.4E+02**	**1.4E+02**	**na**	**2.6E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.4E+02
Arsenic	9.0E+01
Barium	na
Cadmium	7.9E-01
Chromium III	5.2E+01
Chromium VI	6.4E+00
Copper	6.3E+00
Iron	na
Lead	1.0E+01
Manganese	na
Mercury	4.6E-01
Nickel	1.4E+01
Selenium	3.0E+00
Silver	1.9E+00
Zinc	5.5E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: HL Mooney WRF   Permit No.: VA0025101

Receiving Stream: Neabsco Creek (April-October)   Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	105.9 mg/L
90% Temperature (Annual) =	deg C
90% Temperature (Wet season) =	deg C
90% Maximum pH =	SU
10% Maximum pH =	SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	n
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	0 MGD
7Q10 (Annual) =	0 MGD
30Q10 (Annual) =	0 MGD
1Q10 (Wet season) =	0 MGD
30Q10 (Wet season)	0 MGD
30Q5 =	0 MGD
Harmonic Mean =	0 MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	121 mg/L
90% Temp (Annual) =	30.11 deg C
90% Temp (Wet season) =	deg C
90% Maximum pH =	8.9 SU
10% Maximum pH =	SU
Discharge Flow =	24 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	--	--	na	9.9E+02
Acrolein	0	--	--	na	9.3E+00	--	--	na	9.3E+00	--	--	--	--	--	--	--	--	--	--	na	9.3E+00
Acrylonitrile[c]	0	--	--	na	2.5E+00	--	--	na	2.5E+00	--	--	--	--	--	--	--	--	--	--	na	2.5E+00
Aldrin [c]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.0E-04	--	--	--	--	--	--	--	--	3.0E+00	--	na	5.0E-04
Ammonia-N (mg/l) (Yearly)	0	1.56E+00	2.07E-01	na	--	1.56E+00	2.07E-01	na	--	--	--	--	-					1.56E+00	2.07E-01	na	--
Ammonia-N (mg/l) (High Flow)	0	1.56E+00	5.65E-01	na	--	1.56E+00	5.65E-01	na	--	--	--	--	-					1.56E+00	5.65E-01	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.0E+04	--	--	--	-					--	--	na	4.0E+04
Antimony	0	--	--	na	6.4E+02	--	--	na	6.4E+02	--	--	--	-					--	--	na	6.4E+02
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	-					3.4E+02	1.5E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	-					--	--	na	--
Benzene [c]	0	--	--	na	5.1E+02	--	--	na	5.1E+02	--	--	--	-					--	--	na	5.1E+02
Benzidine[c]	0	--	--	na	2.0E-03	--	--	na	2.0E-03	--	--	--						--	--	na	2.0E-03
Benzo (a) anthracene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--						--	--	na	1.8E-01
Benzo (b) fluoranthene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (k) fluoranthene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Benzo (a) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Bis2-Chloroethyl Ether [c]	0	--	--	na	5.3E+00	--	--	na	5.3E+00	--	--	--	--	--	--	--	--	--	--	na	5.3E+00
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	6.5E+04	--	--	--	--	--	--	--	--	--	--	na	6.5E+04
Bis 2-Ethylhexyl Phthalate [c]	0	--	--	na	2.2E+01	--	--	na	2.2E+01	--	--	--	--	--	--	--	--	--	--	na	2.2E+01
Bromoform [c]	0	--	--	na	1.4E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
Cadmium	0	4.9E+00	1.3E+00	na	--	4.9E+00	1.3E+00	na	--	--	--	--	--	--	--	--	--	4.9E+00	1.3E+00	na	--
Carbon Tetrachloride [c]	0	--	--	na	1.6E+01	--	--	na	1.6E+01	--	--	--	--	--	--	--	--	--	--	na	1.6E+01
Chlordane [c]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.3E-03	na	8.1E-03	--	--	--	--	--	--	--	--	2.4E+00	4.3E-03	na	8.1E-03
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	8.6E+05	2.3E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.1E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03

WLAs

1.56 × 4.96 = 7.74

0.207 × 4.96 = 1.03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.3E+02	--	--	--	--	--	--	--	--	--	--	na	1.3E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	8.3E-02	4.1E-02	na	--
Chromium III	0	6.7E+02	8.7E+01	na	--	6.7E+02	8.7E+01	na	--	--	--	--	--	--	--	--	--	6.7E+02	8.7E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene[C]	0	--	--	na	1.8E-02	--	--	na	1.8E-02	--	--	--	--	--	--	--	--	--	--	na	1.8E-02
Copper	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.2E+00	na	1.6E+04	--	--	--	--	--	--	--	--	2.2E+01	5.2E+00	na	1.6E+04
DDD[C]	0	--	--	na	3.1E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	3.1E-03
DDE[C]	0	--	--	na	2.2E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	2.2E-03
DDT[C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.2E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	na	2.2E-03
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	1.7E-01	1.7E-01	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.3E+03	--	--	--	--	--	--	--	--	--	--	na	1.3E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	9.6E+02	--	--	--	--	--	--	--	--	--	--	na	9.6E+02
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	--	--	na	1.9E+02
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	2.8E-01	--	--	--	--	--	--	--	--	--	--	na	2.8E-01
Dichlorobromomethane[C]	0	--	--	na	1.7E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	na	1.7E+02
1,2-Dichloroethane[C]	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	na	3.7E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.1E+03	--	--	--	--	--	--	--	--	--	--	na	7.1E+03
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	2.9E+02	--	--	--	--	--	--	--	--	--	--	na	2.9E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
1,3-Dichloropropene[C]	0	--	--	na	2.1E+02	--	--	na	2.1E+02	--	--	--	--	--	--	--	--	--	--	na	2.1E+02
Dieldrin[C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.6E-02	na	5.4E-04	--	--	--	--	--	--	--	--	2.4E-01	5.6E-02	na	5.4E-04
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.4E+04	--	--	--	--	--	--	--	--	--	--	na	4.4E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	8.5E+02	--	--	--	--	--	--	--	--	--	--	na	8.5E+02
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.1E+06	--	--	--	--	--	--	--	--	--	--	na	1.1E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.5E+03	--	--	--	--	--	--	--	--	--	--	na	4.5E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	na	5.3E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	2.8E+02	--	--	--	--	--	--	--	--	--	--	na	2.8E+02
2,4-Dinitrotoluene[C]	0	--	--	na	3.4E+01	--	--	na	3.4E+01	--	--	--	--	--	--	--	--	--	--	na	3.4E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.1E-08	--	--	--	--	--	--	--	--	--	--	na	5.1E-08
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.0E+00	--	--	--	--	--	--	--	--	--	--	na	2.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	8.9E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	8.9E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	8.9E+01
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	--	--	na	8.9E+01
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.6E-02	na	6.0E-02	--	--	--	--	--	--	--	--	8.6E-02	3.6E-02	na	6.0E-02
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	--	--	na	3.0E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.1E+03	--	--	--	--	--	--	--	--	--	--	na	2.1E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.3E+03	--	--	--	--	--	--	--	--	--	--	na	5.3E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	1.0E-02	na	--
Heptachlor [C]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.8E-03	na	7.9E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	7.9E-04
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.8E-03	na	3.9E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	3.9E-04
Hexachlorobenzene[C]	0	--	--	na	2.9E-03	--	--	na	2.9E-03	--	--	--	--	--	--	--	--	--	--	na	2.9E-03
Hexachlorobutadiene[C]	0	--	--	na	1.8E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	4.9E-02	--	--	na	4.9E-02	--	--	--	--	--	--	--	--	--	--	na	4.9E-02
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	1.7E-01	--	--	na	1.7E-01	--	--	--	--	--	--	--	--	--	--	na	1.7E-01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.8E+00	--	--	--	--	--	--	--	--	9.5E-01	--	na	1.8E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Hexachloroethane[C]	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	--	--	na	3.3E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	2.0E+00	na	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[C]	0	--	--	na	9.6E+03	--	--	na	9.6E+03	--	--	--	--	--	--	--	--	--	--	na	9.6E+03
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	1.5E+02	1.7E+01	na	--	1.5E+02	1.7E+01	na	--	--	--	--	--	--	--	--	--	1.5E+02	1.7E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	7.7E-01	--	--	--	--	--	--	--	--	--	--	1.4E+00	7.7E-01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
Methylene Chloride [C]	0	--	--	na	5.9E+03	--	--	na	5.9E+03	--	--	--	--	--	--	--	--	--	--	na	5.9E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	--	3.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	2.1E+02	2.4E+01	na	4.6E+03	2.1E+02	2.4E+01	na	4.6E+03	--	--	--	--	--	--	--	--	2.1E+02	2.4E+01	na	4.6E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	6.9E+02	--	--	--	--	--	--	--	--	--	--	na	6.9E+02
N-Nitrosodimethylamine[C]	0	--	--	na	3.0E+01	--	--	na	3.0E+01	--	--	--	--	--	--	--	--	--	--	na	3.0E+01
N-Nitrosodiphenylamine[C]	0	--	--	na	6.0E+01	--	--	na	6.0E+01	--	--	--	--	--	--	--	--	--	--	na	6.0E+01
N-Nitrosodi-n-propylamine[C]	0	--	--	na	5.1E+00	--	--	na	5.1E+00	--	--	--	--	--	--	--	--	--	--	na	5.1E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	na	--	--	--	--	--	--	--	--	--	2.8E+01	6.6E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	6.5E-02	1.3E-02	na	--
PCB Total[C]	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.4E-04	--	--	--	--	--	--	--	--	--	1.4E-02	na	6.4E-04
Pentachlorophenol [C]	0	7.7E-03	5.9E-03	na	3.0E+01	7.7E-03	5.9E-03	na	3.0E+01	--	--	--	--	--	--	--	--	7.7E-03	5.9E-03	na	3.0E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	8.6E+05	--	--	--	--	--	--	--	--	--	--	na	8.6E+05
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	--	--	na	4.0E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.0E+00	na	4.2E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**4.2E+03**
Silver	0	4.8E+00	--	na	--	4.8E+00	--	na	--	--	--	--	--	--	--	--	--	**4.8E+00**	**--**	**na**	**--**
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
1,1,2,2-Tetrachloroethane^C	0	--	--	na	4.0E+01	--	--	na	4.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.0E+01**
Tetrachloroethylene^C	0	--	--	na	3.3E+01	--	--	na	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.3E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	4.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**4.7E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**6.0E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Toxaphene ^C	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	2.8E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.2E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.2E-02**	**na**	**--**
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**7.0E+01**
1,1,2-Trichloroethane^C	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**1.6E+02**
Trichloroethylene ^C	0	--	--	na	3.0E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**3.0E+02**
2,4,6-Trichlorophenol ^C	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**--**
Vinyl Chloride^C	0	--	--	na	2.4E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**na**	**2.4E+01**
Zinc	0	1.4E+02	1.4E+02	na	2.6E+04	1.4E+02	1.4E+02	na	2.6E+04	--	--	--	--	--	--	--	--	**1.4E+02**	**1.4E+02**	**na**	**2.6E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.4E+02
Arsenic	9.0E+01
Barium	na
Cadmium	7.9E-01
Chromium III	5.2E+01
Chromium VI	6.4E+00
Copper	6.3E+00
Iron	na
Lead	1.0E+01
Manganese	na
Mercury	4.6E-01
Nickel	1.4E+01
Selenium	3.0E+00
Silver	1.9E+00
Zinc	5.5E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: HL Mooney WRF

Permit No.: VA0025101 (February to March)

Receiving Stream: Neabsco Creek

(FROM THE 2009 Reissuance)

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	mg/L	1Q10 (Annual) =	0 MGD	Annual - 1Q10 Mix =	100 %	Mean Hardness (as CaCO3) =	170 mg/L
90% Temperature (Annual) =	deg C	7Q10 (Annual) =	0 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	deg C
90% Temperature (Wet season) =	deg C	30Q10 (Annual) =	0 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	10.4 deg C
90% Maximum pH =	SU	1Q10 (Wet season) =	0 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	8.42 SU
10% Maximum pH =	SU	30Q10 (Wet season)	0 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	SU
Tier Designation (1 or 2) =	1	30Q5 =	0 MGD			Discharge Flow =	24 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	0 MGD				
Trout Present Y/N? =	n	Annual Average =	n/a MGD				
Early Life Stages Present Y/N? =	y						

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	2.7E+03	--	--	na	2.7E+03	--	--	--	--	--	--	--	--	--	--	na	2.7E+03
Acrolein	0	--	--	na	7.8E+02	--	--	na	7.8E+02	--	--	--	--	--	--	--	--	--	--	na	7.8E+02
Acrylonitrile[c]	0	--	--	na	6.6E+00	--	--	na	6.6E+00	--	--	--	--	--	--	--	--	--	--	na	6.6E+00
Aldrin [c]	0	3.0E+00	--	na	1.4E-03	3.0E+00	--	na	1.4E-03	--	--	--						3.0E+00	--	na	1.4E-03
Ammonia-N (mg/l) (Yearly)	0	3.74E+00	1.25E+00	na	--	3.7E+00	1.2E+00	na	--	--	--	--						3.7E+00	1.2E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	3.74E+00	1.25E+00	na	--	3.7E+00	1.2E+00	na	--	--	--	--						3.7E+00	1.2E+00	na	--
Anthracene	0	--	--	na	1.1E+05	--	--	na	1.1E+05	--	--	--						--	--	na	1.1E+05
Antimony	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--						--	--	na	4.3E+03
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--						3.4E+02	1.5E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--						--	--	na	--
Benzene [c]	0	--	--	na	7.1E+02	--	--	na	7.1E+02	--	--	--						--	--	na	7.1E+02
Benzidine[c]	0	--	--	na	5.4E-03	--	--	na	5.4E-03	--	--	--						--	--	na	5.4E-03
Benzo (a) anthracene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Benzo (b) fluoranthene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Benzo (k) fluoranthene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Benzo (a) pyrene [c]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Bis2-Chloroethyl Ether	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	--	--	na	1.4E+01
Bis2-Chloroisopropyl Ether	0	--	--	na	1.7E+05	--	--	na	1.7E+05	--	--	--	--	--	--	--	--	--	--	na	1.7E+05
Bromoform [c]	0	--	--	na	3.6E+03	--	--	na	3.6E+03	--	--	--	--	--	--	--	--	--	--	na	3.6E+03
Butylbenzylphthalate	0	--	--	na	5.2E+03	--	--	na	5.2E+03	--	--	--	--	--	--	--	--	--	--	na	5.2E+03
Cadmium	0	7.1E+00	1.7E+00	na	--	7.1E+00	1.7E+00	na	--	--	--	--	--	--	--	--	--	7.1E+00	1.7E+00	na	--
Carbon Tetrachloride [c]	0	--	--	na	4.4E+01	--	--	na	4.4E+01	--	--	--	--	--	--	--	--	--	--	na	4.4E+01
Chlordane [c]	0	2.4E+00	4.3E-03	na	2.2E-02	2.4E+00	4.3E-03	na	2.2E-02	--	--	--	--	--	--	--	--	2.4E+00	4.3E-03	na	2.2E-02
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	8.6E+05	2.3E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.1E+01	na	--
Chlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	2.1E+04

WLAs presented < with only one decimal place

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	3.4E+02	--	--	na	3.4E+02	--	--	--	--	--	--	--	--	--	--	na	3.4E+02
Chloroform[C]	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	--	--	na	2.9E+04
2-Chloronaphthalene	0	--	--	na	4.3E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	--	--	na	4.3E+03
2-Chlorophenol	0	--	--	na	4.0E+02	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	--	--	na	4.0E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	8.3E-02	4.1E-02	na	--
Chromium III	0	8.8E+02	1.1E+02	na	--	8.8E+02	1.1E+02	na	--	--	--	--	--	--	--	--	--	8.8E+02	1.1E+02	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Chromium, Total	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene[C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Copper	0	2.2E+01	1.4E+01	na	--	2.2E+01	1.4E+01	na	--	--	--	--	--	--	--	--	--	2.2E+01	1.4E+01	na	--
Cyanide	0	2.2E+01	5.2E+00	na	2.2E+05	2.2E+01	5.2E+00	na	2.2E+05	--	--	--	--	--	--	--	--	2.2E+01	5.2E+00	na	2.2E+05
DDD[C]	0	--	--	na	8.4E-03	--	--	na	8.4E-03	--	--	--	--	--	--	--	--	--	--	na	8.4E-03
DDE[C]	0	--	--	na	5.9E-03	--	--	na	5.9E-03	--	--	--	--	--	--	--	--	--	--	na	5.9E-03
DDT[C]	0	1.1E+00	1.0E-03	na	5.9E-03	1.1E+00	1.0E-03	na	5.9E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	na	5.9E-03
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Dibenz(a,h)anthracene[C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Dibutyl phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
Dichloromethane (Methylene Chloride)[C]	0	--	--	na	1.6E+04	--	--	na	1.6E+04	--	--	--	--	--	--	--	--	--	--	na	1.6E+04
1,2-Dichlorobenzene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	--	--	na	1.7E+04
1,3-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	--	--	na	2.6E+03
1,4-Dichlorobenzene	0	--	--	na	2.6E+03	--	--	na	2.6E+03	--	--	--	--	--	--	--	--	--	--	na	2.6E+03
3,3-Dichlorobenzidine[C]	0	--	--	na	7.7E-01	--	--	na	7.7E-01	--	--	--	--	--	--	--	--	--	--	na	7.7E-01
Dichlorobromomethane[C]	0	--	--	na	4.6E+02	--	--	na	4.6E+02	--	--	--	--	--	--	--	--	--	--	na	4.6E+02
1,2-Dichloroethane[C]	0	--	--	na	9.9E+02	--	--	na	9.9E+02	--	--	--	--	--	--	--	--	--	--	na	9.9E+02
1,1-Dichloroethylene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	--	--	na	1.7E+04
1,2-trans-dichloroethylene	0	--	--	na	1.4E+05	--	--	na	1.4E+05	--	--	--	--	--	--	--	--	--	--	na	1.4E+05
2,4-Dichlorophenol	0	--	--	na	7.9E+02	--	--	na	7.9E+02	--	--	--	--	--	--	--	--	--	--	na	7.9E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	3.9E+02	--	--	na	3.9E+02	--	--	--	--	--	--	--	--	--	--	na	3.9E+02
1,3-Dichloropropene	0	--	--	na	1.7E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
Dieldrin[C]	0	2.4E-01	5.6E-02	na	1.4E-03	2.4E-01	5.6E-02	na	1.4E-03	--	--	--	--	--	--	--	--	2.4E-01	5.6E-02	na	1.4E-03
Diethyl Phthalate	0	--	--	na	1.2E+05	--	--	na	1.2E+05	--	--	--	--	--	--	--	--	--	--	na	1.2E+05
Di-2-Ethylhexyl Phthalate[C]	0	--	--	na	5.9E+01	--	--	na	5.9E+01	--	--	--	--	--	--	--	--	--	--	na	5.9E+01
2,4-Dimethylphenol	0	--	--	na	2.3E+03	--	--	na	2.3E+03	--	--	--	--	--	--	--	--	--	--	na	2.3E+03
Dimethyl Phthalate	0	--	--	na	2.9E+06	--	--	na	2.9E+06	--	--	--	--	--	--	--	--	--	--	na	2.9E+06
Di-n-Butyl Phthalate	0	--	--	na	1.2E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
2,4 Dinitrophenol	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	--	--	na	1.4E+04
2-Methyl-4,6-Dinitrophenol	0	--	--	na	7.65E+02	--	--	na	7.7E+02	--	--	--	--	--	--	--	--	--	--	na	7.7E+02
2,4-Dinitrotoluene[C]	0	--	--	na	9.1E+01	--	--	na	9.1E+01	--	--	--	--	--	--	--	--	--	--	na	9.1E+01
Dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin) (ppq)	0	--	--	na	1.2E-06	--	--	na	na	--	--	--	--	--	--	--	--	--	--	na	na
1,2-Diphenylhydrazine[C]	0	--	--	na	5.4E+00	--	--	na	5.4E+00	--	--	--	--	--	--	--	--	--	--	na	5.4E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	2.4E+02
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	2.4E+02	2.2E-01	5.6E-02	na	2.4E+02	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	2.4E+02
Endosulfan Sulfate	0	--	--	na	2.4E+02	--	--	na	2.4E+02	--	--	--	--	--	--	--	--	--	--	na	2.4E+02
Endrin	0	8.6E-02	3.6E-02	na	8.1E-01	8.6E-02	3.6E-02	na	8.1E-01	--	--	--	--	--	--	--	--	8.6E-02	3.6E-02	na	8.1E-01
Endrin Aldehyde	0	--	--	na	8.1E-01	--	--	na	8.1E-01	--	--	--	--	--	--	--	--	--	--	na	8.1E-01

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.9E+04	--	--	na	2.9E+04	--	--	--	--	--	--	--	--	--	--	na	2.9E+04
Fluoranthene	0	--	--	na	3.7E+02	--	--	na	3.7E+02	--	--	--	--	--	--	--	--	--	--	na	3.7E+02
Fluorene	0	--	--	na	1.4E+04	--	--	na	1.4E+04	--	--	--	--	--	--	--	--	--	--	na	1.4E+04
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	1.0E-02	na	--
Heptachlor[C]	0	5.2E-01	3.8E-03	na	2.1E-03	5.2E-01	3.8E-03	na	2.1E-03	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	2.1E-03
Heptachlor Epoxide[C]	0	5.2E-01	3.8E-03	na	1.1E-03	5.2E-01	3.8E-03	na	1.1E-03	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	1.1E-03
Hexachlorobenzene[C]	0	--	--	na	7.7E-03	--	--	na	7.7E-03	--	--	--	--	--	--	--	--	--	--	na	7.7E-03
Hexachlorobutadiene[C]	0	--	--	na	5.0E+02	--	--	na	5.0E+02	--	--	--	--	--	--	--	--	--	--	na	5.0E+02
Hexachlorocyclohexane Alpha-BHC[C]	0	--	--	na	1.3E-01	--	--	na	1.3E-01	--	--	--	--	--	--	--	--	--	--	na	1.3E-01
Hexachlorocyclohexane Beta-BHC[C]	0	--	--	na	4.6E-01	--	--	na	4.6E-01	--	--	--	--	--	--	--	--	--	--	na	4.6E-01
Hexachlorocyclohexane Gamma-BHC[C] (Lindane)	0	9.5E-01	na	na	6.3E-01	9.5E-01	--	na	6.3E-01	--	--	--	--	--	--	--	--	9.5E-01	--	na	6.3E-01
Hexachlorocyclopentadiene	0	--	--	na	1.7E+04	--	--	na	1.7E+04	--	--	--	--	--	--	--	--	--	--	na	1.7E+04
Hexachloroethane[C]	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	--	--	na	8.9E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	2.0E+00	na	--
Indeno (1,2,3-cd) pyrene[C]	0	--	--	na	4.9E-01	--	--	na	4.9E-01	--	--	--	--	--	--	--	--	--	--	na	4.9E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone[C]	0	--	--	na	2.6E+04	--	--	na	2.6E+04	--	--	--	--	--	--	--	--	--	--	na	2.6E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	2.3E+02	2.7E+01	na	--	2.3E+02	2.7E+01	na	--	--	--	--	--	--	--	--	--	2.3E+02	2.7E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	na	5.1E-02	1.4E+00	7.7E-01	na	5.1E-02	--	--	--	--	--	--	--	--	1.4E+00	7.7E-01	na	5.1E-02
Methyl Bromide	0	--	--	na	4.0E+03	--	--	na	4.0E+03	--	--	--	--	--	--	--	--	--	--	na	4.0E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	--	3.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Monochlorobenzene	0	--	--	na	2.1E+04	--	--	na	2.1E+04	--	--	--	--	--	--	--	--	--	--	na	2.1E+04
Nickel	0	2.9E+02	3.2E+01	na	4.6E+03	2.9E+02	3.2E+01	na	4.6E+03	--	--	--	--	--	--	--	--	2.9E+02	3.2E+01	na	4.6E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	1.9E+03	--	--	na	1.9E+03	--	--	--	--	--	--	--	--	--	--	na	1.9E+03
N-Nitrosodimethylamine[C]	0	--	--	na	8.1E+01	--	--	na	8.1E+01	--	--	--	--	--	--	--	--	--	--	na	8.1E+01
N-Nitrosodiphenylamine[C]	0	--	--	na	1.6E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	na	1.6E+02
N-Nitrosodi-n-propylamine[C]	0	--	--	na	1.4E+01	--	--	na	1.4E+01	--	--	--	--	--	--	--	--	--	--	na	1.4E+01
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	6.5E-02	1.3E-02	na	--
PCB-1016	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1221	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1232	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1242	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1248	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1254	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB-1260	0	--	1.4E-02	na	--	--	1.4E-02	na	--	--	--	--	--	--	--	--	--	--	1.4E-02	na	--
PCB Total[C]	0	--	--	na	1.7E-03	--	--	na	1.7E-03	--	--	--	--	--	--	--	--	--	--	na	1.7E-03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Pentachlorophenol [C]	0	7.7E-03	5.9E-03	na	8.2E+01	7.7E-03	5.9E-03	na	8.2E+01	--	--	--	--	--	--	--	--	7.7E-03	5.9E-03	na	8.2E+01
Phenol	0	--	--	na	4.6E+06	--	--	na	4.6E+06	--	--	--	--	--	--	--	--	--	--	na	4.6E+06
Pyrene	0	--	--	na	1.1E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
Radionuclides (pCi/l except Beta/Photon)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity	0	--	--	na	1.5E+01	--	--	na	1.5E+01	--	--	--	--	--	--	--	--	--	--	na	1.5E+01
Beta and Photon Activity (mrem/yr)	0	--	--	na	4.0E+00	--	--	na	4.0E+00	--	--	--	--	--	--	--	--	--	--	na	4.0E+00
Strontium-90	0	--	--	na	8.0E+00	--	--	na	8.0E+00	--	--	--	--	--	--	--	--	--	--	na	8.0E+00
Tritium	0	--	--	na	2.0E+04	--	--	na	2.0E+04	--	--	--	--	--	--	--	--	--	--	na	2.0E+04
Selenium	0	2.0E+01	5.0E+00	na	1.1E+04	2.0E+01	5.0E+00	na	1.1E+04	--	--	--	--	--	--	--	--	2.0E+01	5.0E+00	na	1.1E+04
Silver	0	8.6E+00	--	na	--	8.6E+00	--	na	--	--	--	--	--	--	--	--	--	8.6E+00	--	na	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,1,2,2-Tetrachloroethane [C]	0	--	--	na	1.1E+02	--	--	na	1.1E+02	--	--	--	--	--	--	--	--	--	--	na	1.1E+02
Tetrachloroethylene [C]	0	--	--	na	8.9E+01	--	--	na	8.9E+01	--	--	--	--	--	--	--	--	--	--	na	8.9E+01
Thallium	0	--	--	na	6.3E+00	--	--	na	6.3E+00	--	--	--	--	--	--	--	--	--	--	na	6.3E+00
Toluene	0	--	--	na	2.0E+05	--	--	na	2.0E+05	--	--	--	--	--	--	--	--	--	--	na	2.0E+05
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	7.5E-03	7.3E-01	2.0E-04	na	7.5E-03	--	--	--	--	--	--	--	--	7.3E-01	2.0E-04	na	7.5E-03
Tributyltin	0	4.6E-01	6.3E-02	na	--	4.6E-01	6.3E-02	na	--	--	--	--	--	--	--	--	--	4.6E-01	6.3E-02	na	--
1,2,4-Trichlorobenzene	0	--	--	na	9.4E+02	--	--	na	9.4E+02	--	--	--	--	--	--	--	--	--	--	na	9.4E+02
1,1,2-Trichloroethane [C]	0	--	--	na	4.2E+02	--	--	na	4.2E+02	--	--	--	--	--	--	--	--	--	--	na	4.2E+02
Trichloroethylene [C]	0	--	--	na	8.1E+02	--	--	na	8.1E+02	--	--	--	--	--	--	--	--	--	--	na	8.1E+02
2,4,6-Trichlorophenol [C]	0	--	--	na	6.5E+01	--	--	na	6.5E+01	--	--	--	--	--	--	--	--	--	--	na	6.5E+01
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Vinyl Chloride [C]	0	--	--	na	6.1E+01	--	--	na	6.1E+01	--	--	--	--	--	--	--	--	--	--	na	6.1E+01
Zinc	0	1.8E+02	1.9E+02	na	6.9E+04	1.8E+02	1.9E+02	na	6.9E+04	--	--	--	--	--	--	--	--	1.8E+02	1.9E+02	na	6.9E+04

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information. Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens, Harmonic Mean for Carcinogens, and Annual Average for Dioxin. Mixing ratios may be substituted for stream flows where appropriate.

Metal	Target Value (SSTV)
Antimony	4.3E+03
Arsenic	9.0E+01
Barium	na
Cadmium	1.0E+00
Chromium III	6.9E+01
Chromium VI	6.4E+00
Copper	8.5E+00
Iron	na
Lead	1.6E+01
Manganese	na
Mercury	5.1E-02
Nickel	1.9E+01
Selenium	3.0E+00
Silver	3.4E+00
Zinc	7.3E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Neabsco Creek @ Rail Road Bridge
STATION : 1aNEA000.57

Collection Date Time	Depth	Do Probe	Fdt Do Opt	Temp Celcius	Field Ph	Specific Cc	Comment
3/1/10 9:50	0.5	13.9		4.6	7.8	560	
3/1/10 9:50	1	13.9		4.6	7.8	560	
3/1/10 9:50	1.5	14.1		4.5	7.8	558	
3/1/10 9:50	2	14.1		4.5	7.9	552	
3/1/10 9:50	2.5	14.1		4.5	7.9	553	
3/1/10 9:50	3	13.9		4.5	7.8	552	
4/5/10 9:39	0.5	9.1		18.4	7.3	369	CHLOROPHYLL 2X150ML
4/5/10 9:39	1	9		18.1	7.3	366	
4/5/10 9:39	1.5	8.9		18	7.3	364	
4/5/10 9:39	2	8.9		18	7.3	360	
4/5/10 9:39	2.5	9.2		17.9	7.3	356	
4/5/10 9:39	3	8.9		18	7.3	363	
5/13/10 10:12	0.5	8.5		17.2	7.5	386	
5/13/10 10:12	1	8.4		17.2	7.5	382	
5/13/10 10:12	1.5	8.4		17.2	7.6	276	
5/13/10 10:12	2	8.4		17.2	7.6	283	
5/13/10 10:12	2.5	8.4		17.2	7.6	287	
6/14/10 10:20	0.5		8.8	27.7	8.3	319	
6/14/10 10:20	1		8.8	27.7	8.3	319	
6/14/10 10:20	1.5		8.7	27.7	8.3	321	
6/14/10 10:20	2		8.6	27.6	8.3	320	
6/14/10 10:20	2.5		8.5	27.6	8.3	316	
6/14/10 10:20	3		8.5	27.6	8.3	316	
7/19/10 9:25	0.5		6.4	29.8	7.6	683	
7/19/10 9:25	1		4.2	29.1	7.3	643	
7/19/10 9:25	1.5		3.5	29	7.2	637	
7/19/10 9:25	2		2.9	28.7	7.1	616	
7/19/10 9:25	2.5		2.2	28.4	7.1	609	
8/23/10 9:55	0.5		4.6	27	7.2	837	
8/23/10 9:55	1		4.5	26.9	7.2	825	
8/23/10 9:55	1.5		4.6	27	7.2	831	
8/23/10 9:55	2		4.7	27	7.2	834	
8/23/10 9:55	2.5		4.5	27	7.2	832	
8/23/10 9:55	3		4.6	27	7.3	841	
9/20/10 9:55	0.5		4.9	23.3	7.2	1585	
9/20/10 9:55	1		4.8	23.3	7.2	1632	
9/20/10 9:55	1.5		4.8	23.3	7.2	1623	
9/20/10 9:55	2		4.9	23.3	7.2	1626	
9/20/10 9:55	2.5		5.1	23.4	7.2	1640	
9/20/10 9:55	3		4.7	23.3	7.2	1639	
1/31/11 10:17	0.5	10.9		5	7.2	1638	
1/31/11 10:17	1	10.5		5	7.2	1639	
1/31/11 10:17	1.5	10.5		4.9	7.2	1643	
1/31/11 10:17	2	10.5		5	7.3	1641	
1/31/11 10:17	2.5	10.4		5	7.3	1652	
3/14/11 9:55	0.5		9.6	10	7.4	433	
3/14/11 9:55	1		9.5	10	7.4	432	
3/14/11 9:55	1.5		9.5	9.9	7.4	437	
3/14/11 9:55	2		9.5	9.8	7.4	438	
3/14/11 9:55	2.5		9.5	9.6	7.4	434	
4/7/11 9:25	0.5	11.9		11.5	8.4	290	
4/7/11 9:25	1	11.7		11.4	8.4	290	
4/7/11 9:25	1.5	11.8		11.4	8.4	290	
4/7/11 9:25	2	11.6		11.4	8.3	290	
4/7/11 9:25	2.5	11.5		11.4	8.3	290	
4/7/11 9:25	3	11.3		11.4	8.2	291	
5/2/11 10:10	0.5	10.4		17.9	8.6	249	

pH 90th percentile calculations

8.396	90th percentile of all pH values
7.955	90th percentile for Nov-Jan
8.248	90th percentile for Feb-Mar
8.54	90th percentile for Apr-Oct

Temperature 90th percentile calculations

27.877	90th percentile of all temp values
9.675	90th percentile for Nov-Jan
9.98	90th percentile for Feb-Mar
28.005	90th percentile for Apr-Oct

pH (Nov-Jan)	Temp(Nov-Jan)	pH(Apr-Oct)	Temp(Apr-Oct)
7.2	5	7.3	18.4
8	11.1	7.5	17.2
7.57	4.67	8.3	27.7
7.8	7.41	7.6	29.8
7.91	8.25	7.2	27
7.42	3.67	7.2	23.3
		7.48	11.5
		7.47	17.9
		6.94	26.2
		8.62	28.8
		7.02	27.9
		8.4	23.2
		8.6	15.32
		8.9	27.85
		7.3	24.04
		8.3	27.88
		6.7	24.73
		8.36	18.08
		7.65	18.33
		7.08	21.26
		7.19	28.05
		7.39	22.9
		7.22	21.54
		7.38	12.03

pH(Feb-Mar)	Temp(Feb-Mar)
7.8	4.6
7.4	10
8.34	9.95
7.78	4.53
8.11	4.86

5/2/11 10:10	1	10.4		17.9	8.7	245
5/2/11 10:10	1.5	10.5		17.9	8.7	242
5/2/11 10:10	2	10.6		17.9	8.7	242
5/2/11 10:10	2.5	10.6		17.9	8.7	242
5/2/11 10:10	3	10.7		17.9	8.7	241
6/7/11 9:40	0.5	10.9		26.2	8.9	275
6/7/11 9:40	1	11		26.2	8.9	278
6/7/11 9:40	1.5	10.8		26.1	8.9	276
6/7/11 9:40	2	10.3		25.9	8.7	286
6/7/11 9:40	2.5	10		25.8	8.5	302
6/7/11 9:40	3	9.9		25.7	8.5	304
7/27/11 10:00	0.5	3.6		28.8	7.3	454
7/27/11 10:00	1	3.5		28.7	7.3	457
7/27/11 10:00	1.5	3.5		28.7	7.3	456
7/27/11 10:00	2	3.4		28.7	7.3	455
7/27/11 10:00	2.5	3.5		28.7	7.3	458
7/27/11 10:00	3	3.5		28.7	7.3	456
8/18/11 13:15	0.5		9.3	27.9	8.3	561
8/18/11 13:15	1		9.3	27.9	8.3	561
8/18/11 13:15	1.5		9.2	27.9	8.3	561
8/18/11 13:15	2		9.2	27.9	8.3	561
8/18/11 13:15	2.5		9.2	27.9	8.3	561
8/18/11 13:15	3		9.1	27.8	8.3	561
9/26/11 10:00	0.5		4.3	23.2	6.7	305
9/26/11 10:00	1		4.7	23.2	6.7	308
9/26/11 10:00	1.5		4.6	23.2	6.7	306
9/26/11 10:00	2		4	23.2	6.7	303
9/26/11 10:00	2.5		4.7	23.2	6.7	305
9/26/11 10:00	3		4.4	23.2	6.7	306
11/28/11 9:40	0.5	11.7		11.1	8	319
11/28/11 9:40	1	11.7		11.1	8	320
11/28/11 9:40	1.5	11.7		11	8	319
11/28/11 9:40	2	11.8		11	8	318
11/28/11 9:40	2.5	11.7		11	7.9	318
11/28/11 9:40	3	11.7		11	7.9	317
11/28/11 9:40	3.5	11.9		10.9	7.9	317
1/30/12 9:44	0.5	12.23		4.67	7.57	308
1/30/12 9:44	1	12.19		4.67	7.53	312
1/30/12 9:44	1.5	12.22		4.65	7.5	312
1/30/12 9:44	2	12.27		4.63	7.48	307
1/30/12 9:44	2.5	12.24		4.64	7.43	320
3/12/12 9:55	0.5	13.14		9.95	8.34	306
3/12/12 9:55	1	13.13		9.91	8.35	307
3/12/12 9:55	1.5	13.1		9.87	8.32	307
3/12/12 9:55	2	13.08		9.86	8.28	307
3/12/12 9:55	2.5	13.08		9.85	8.27	307
3/12/12 9:55	3	12.99		9.84	8.12	307
4/2/12 9:55	0.5		8.63	15.32	7.48	460
4/2/12 9:55	1		8.62	15.3	7.49	460
4/2/12 9:55	1.5		8.63	15.32	7.48	461
4/2/12 9:55	2		8.65	15.26	7.48	453
4/2/12 9:55	2.5		8.67	15.3	7.47	455
4/2/12 9:55	3		8.79	15.24	7.46	443
5/29/12 9:15	0.5		6.24	27.85	7.47	310
5/29/12 9:15	1		6.04	27.6	7.39	319
5/29/12 9:15	1.5		5.97	27.55	7.37	320
5/29/12 9:15	2		5.85	27.46	7.3	325
5/29/12 9:15	2.5		3.86	26.24	7	384
6/13/12 10:00	0.5		3.92	24.04	6.94	266
6/13/12 10:00	1		3.94	24.05	6.93	266
6/13/12 10:00	1.5		3.9	24.05	6.93	367
6/13/12 10:00	2		3.9	24.04	6.92	368

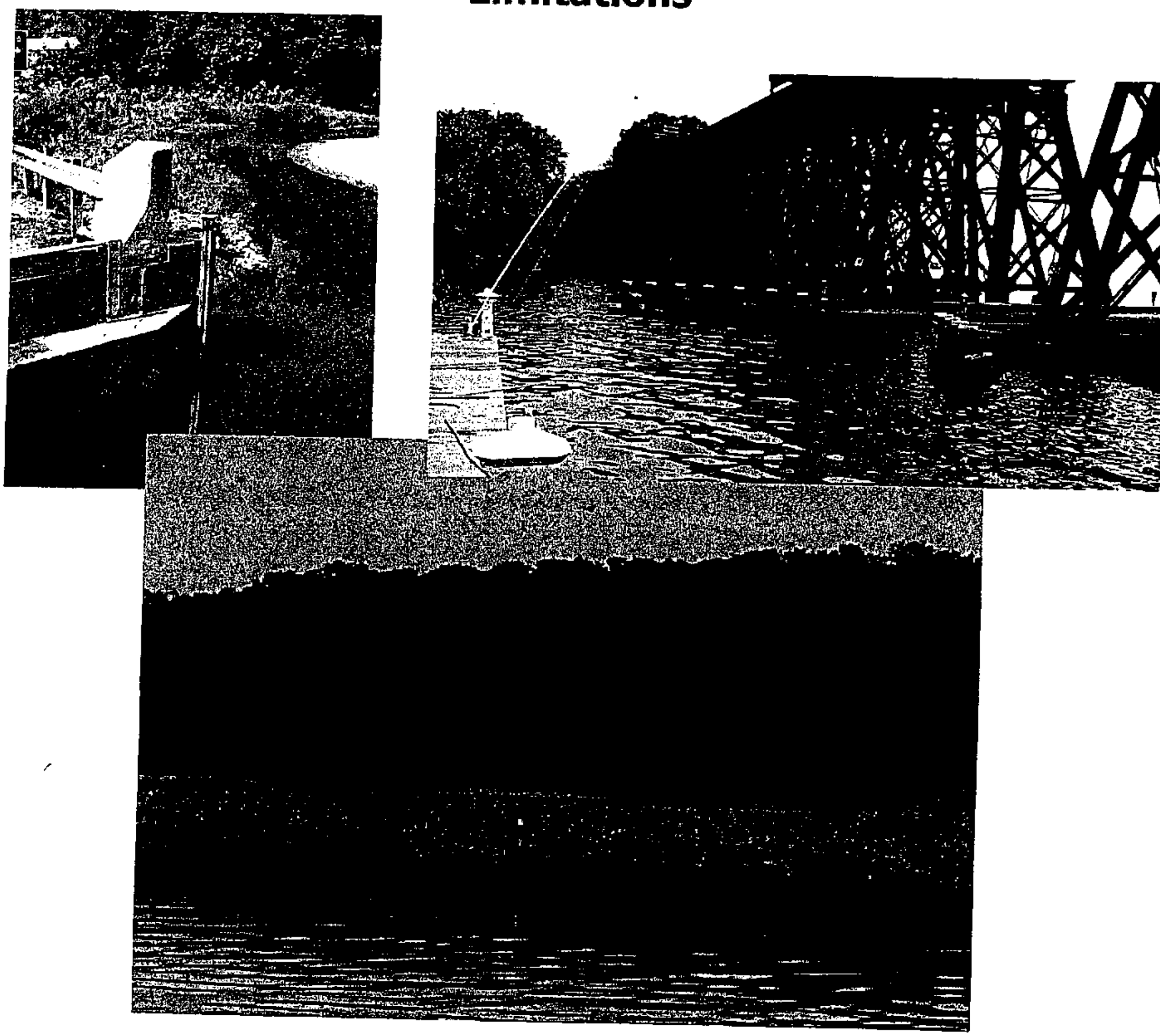
6/13/12 10:00	2.5		3.88	24.02	6.92	368
6/13/12 10:00	3		3.9	24.05	6.92	367
7/23/12 9:05	0.5		9.75	27.88	8.62	331
7/23/12 9:05	1		8.7	27.49	8.18	339
7/23/12 9:05	1.5		8.41	27.41	8.08	339
7/23/12 9:05	2		8.05	27.35	7.92	344
7/23/12 9:05	2.5		7.72	27.26	7.8	344
7/23/12 9:05	3		6.5	27.07	7.55	349
7/23/12 9:05	3.5		6.02	27.04	7.48	354
8/27/12 10:30	0.5		3.31	24.73	7.02	470
8/27/12 10:30	1		3.27	24.72	7.01	469
8/27/12 10:30	1.5		3.27	24.72	7.01	470
8/27/12 10:30	2		3.24	24.7	7.01	469
8/27/12 10:30	2.5		3.23	24.69	7.01	469
8/27/12 10:30	3		3.15	24.69	7.01	470
12/3/12 9:20	0.5	11.6		7.41	7.8	515
12/3/12 9:20	1	11.58		7.27	7.81	511
12/3/12 9:20	1.5	11.56		7.24	7.8	511
12/3/12 9:20	2	11.58		7.3	7.79	513
12/3/12 9:20	2.5	11.46		7.3	7.77	514
12/3/12 9:20	3	11.43		7.29	7.76	517
2/25/13 10:05	0.5		13.17	4.53	7.78	382
2/25/13 10:05	1		13.14	4.5	7.78	385
2/25/13 10:05	1.5		13.19	4.58	7.75	382
2/25/13 10:05	2		13.14	4.64	7.79	381
4/15/13 9:50	0.5		9.43	18.08	8.36	328
4/15/13 9:50	1		9.54	18	8.46	320
4/15/13 9:50	1.5		9.79	17.92	8.59	315
4/15/13 9:50	2		9.96	17.74	8.65	304
4/15/13 9:50	2.5		10.01	17.72	8.64	305
4/15/13 9:50	3		9.97	17.72	8.63	305
5/13/13 9:24	0.5	8.55		18.33	7.65	304
5/13/13 9:24	1	8.26		18.17	7.6	307
5/13/13 9:24	1.5	8.16		18.15	7.59	304
5/13/13 9:24	2	8.12		18.07	7.58	304
5/13/13 9:24	2.5	8.13		18.06	7.58	301
5/13/13 9:24	3	8.05		18.09	7.54	302
6/4/13 9:39	0.5	5.32		21.26	7.08	326
6/4/13 9:39	1	5.36		21.25	7.09	326
6/4/13 9:39	1.5	5.38		21.23	7.1	325
6/4/13 9:39	2	5.41		21.2	7.11	326
6/4/13 9:39	2.5	5.44		21.2	7.11	327
7/15/13 9:38	0.5	6.95		28.05	7.19	258
7/15/13 9:38	1	7.01		28.11	7.19	258
7/15/13 9:38	1.5	7.01		28.04	7.19	258
7/15/13 9:38	2	7		28.03	7.17	257
7/15/13 9:38	2.5	6.19		27.7	7.09	262
7/15/13 9:38	3	5.13		27.36	6.98	271
8/19/13 9:35	0.5		5.54	22.9	7.39	346
8/19/13 9:35	1		5.54	22.89	7.38	346
8/19/13 9:35	1.5		5.45	22.87	7.36	347
8/19/13 9:35	2		5.39	22.85	7.34	350
8/19/13 9:35	2.5		5.41	22.85	7.35	350
8/19/13 9:35	3		5.42	22.87	7.34	349
8/19/13 9:35	3.5		5.27	22.85	7.32	351
9/16/13 9:25	0.5		4.31	21.54	7.22	426
9/16/13 9:25	1		4.31	21.58	7.2	425
9/16/13 9:25	1.5		4.39	21.57	7.19	427
9/16/13 9:25	2		4.38	21.55	7.15	425
9/16/13 9:25	2.5		4.27	21.56	7.1	423
9/16/13 9:25	3		4.35	21.57	7.14	425
10/28/13 9:50	0.5		7.97	12.03	7.38	486

10/28/13 9:50	1	7.63	11.95	7.33	491	
10/28/13 9:50	1.5	7.39	11.94	7.36	499	
10/28/13 9:50	2	7.27	11.89	7.29	502	
10/28/13 9:50	2.5	7.22	11.88	7.28	504	
10/28/13 9:50	3	6.96	11.78	7.18	506	
11/20/13 9:30	0.5	10.84	8.25	7.91	580	
11/20/13 9:30	1	10.74	8.27	7.87	581	
11/20/13 9:30	1.5	10.74	8.26	7.81	581	
11/20/13 9:30	2	10.78	8.26	7.75	578	
11/20/13 9:30	2.5	10.67	8.28	7.76	578	
11/20/13 9:30	3	10.66	8.28	7.71	579	
12/19/13 9:30	0.5	11.27	3.67	7.42	423	BOTTOM DEPTH = 3.3 M
12/19/13 9:30	1	11.21	3.66	7.38	421	
12/19/13 9:30	1.5	11.21	3.67	7.33	420	
12/19/13 9:30	2	11.2	3.67	7.33	423	
12/19/13 9:30	2.5	11.18	3.68	7.32	420	
12/19/13 9:30	3	11.23	3.65	7.28	423	
3/24/14 10:05	0.5	12.56	4.86	8.11	447	
3/24/14 10:05	1	12.55	4.75	7.98	475	
3/24/14 10:05	1.5	12.38	4.7	7.81	545	
3/24/14 10:05	2	12.38	4.53	7.72	565	

Prince William County Service Authority
H.L. Mooney Water Reclamation Facility

VPDES Permit No. VA0025101

In-Stream Monitoring Report For the Evaluation of Ammonia Effluent Limitations



GREELEY AND HANSEN

Attachment 8

Prince William County Service Authority
H.L. Mooney Water Reclamation Facility
VPDES Permit No. VA0025101

In-Stream Monitoring Report
For the Evaluation of Ammonia Effluent Limitations

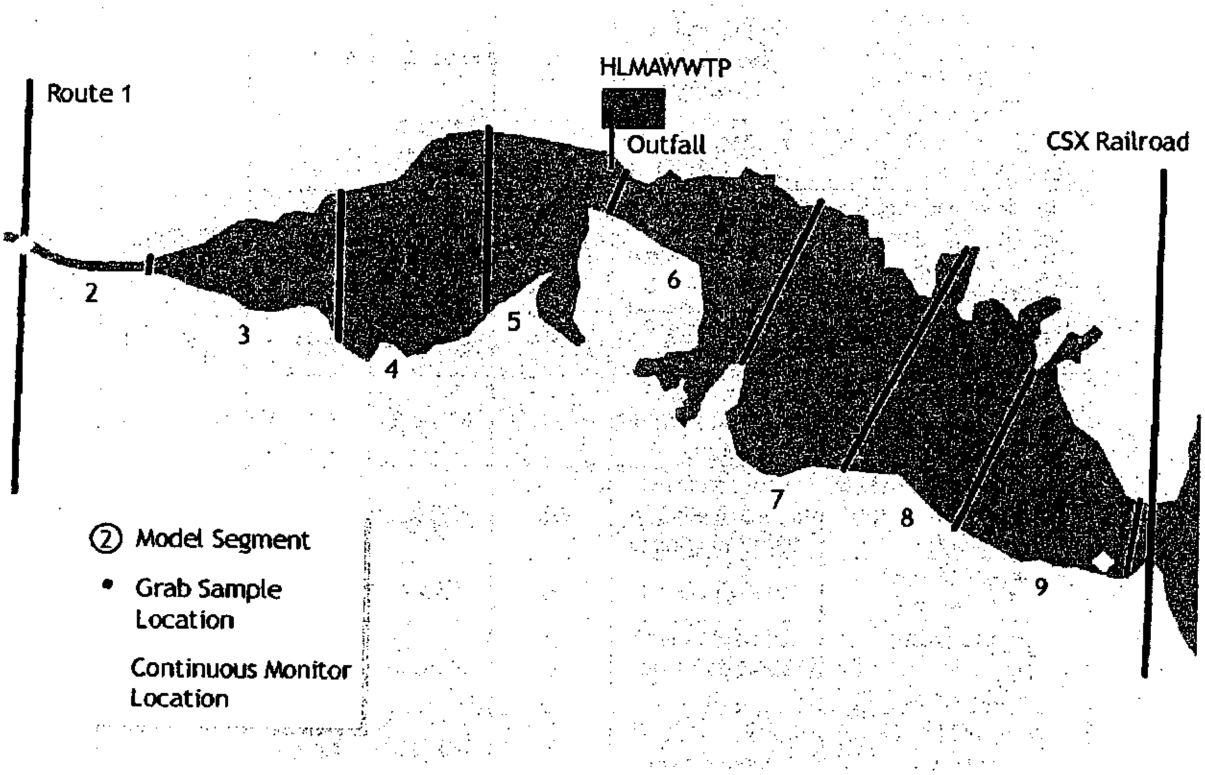
Greeley and Hansen LLC
December 1, 2005

1.0 Introduction

The Prince William County Service Authority (Service Authority) owns and operates the H.L. Mooney Water Reclamation Facility (Mooney WRF, plant). The plant discharges treated effluent to Neabsco Creek, a tributary of the Potomac River. On October 15, 2003, the Virginia Department of Environmental Quality (VDEQ) reissued the VPDES Permit for the Mooney WRF (2003 permit). The 2003 permit includes effluent limitations for ammonia based on a limited data set from grab samples taken sporadically over a period of several years. Part I.E.11 of the permit calls for instream monitoring for temperature and pH in Neabsco Creek to confirm the 2003 ammonia limits. Previously, the Service Authority utilized the Neabsco Creek Embayment Model developed by the Virginia Institute of Marine Science (VIMS model) to assist in the development of permit limits; this model was updated and used again for this analysis.

As called for in the VPDES Permit, the Service Authority has conducted the in-stream monitoring study to assist in determining waste load allocations for Neabsco Creek and discharge limits for the Mooney WRF. The instream sampling plan consists of taking twice-monthly grab samples from eight segments matching those of the VIMS model. Four of the segments are upstream of the plant, representing water quality before the Mooney WRF, and four locations are downstream of the plant, representing water quality after the addition of the Mooney WRF effluent. These sampling locations are shown in Figure 1. GPS was used to assure grab samples were taken in the same locations throughout the sampling program. In addition to the biweekly grab-samples, the approved sampling plan called for two continuous monitors to be installed in Neabsco Creek. One located at the Route 1 Bridge upstream of the plant (upstream probe) and one at the CSX Railroad Bridge near the confluence of Neabsco Creek with Neabsco Bay and the Potomac River (downstream probe). After extensive negotiations with CSX and an adjacent marina, the location of the downstream probe was changed from the CSX Bridge to a marina pier as discussed in the *Preliminary Monitoring Report* issued to VDEQ in April 2005. The Instream monitoring was originally scheduled to begin in June 15, 2004 and end February 15, 2005. However, due to the extensive negotiations concerning locations of the probes and other complications, this sampling period was adjusted to November 17, 2004 though September 30, 2005 with VDEQ consent.

Figure 1: Neabsco Creek Sampling Locations



2.0 Sampling Results

During the sampling period gaps and anomalies in the data and sampling procedures were noted and corrective action was taken. Data were recorded, tracked and graphed and efforts were made to understand and explain unexpected results. These are discussed below.

2.1 Sampling Anomalies

During any extended sampling period anomalies and gaps in data due to equipment outages, weather or other uncontrollable events are to be expected. Several such events were experienced during this sampling program and are outlined below. As problems arose, solutions were developed which aimed to prevent a repetition of the same problem. Table 1 below provides a summary of the sampling anomalies that were experienced during this project. The table shows anomalies and gaps in the continuous monitoring probes that lasted for at least one calendar day. There were gaps in the data which last less than one day, these smaller gaps typically represent the times that the probes' data were being downloaded or during which routine maintenance was being performed.

Table 1– Sampling Gaps in Continuous Monitoring Probes

Probe	Start Date	End Date	Days	Reason for Problem	Solution
Upstream	11/20/04	11/30/04	11	Probe failure during long deployment	Decrease interval between probe maintenance and calibration
	1/22/05	2/16/05	26	Probe Failure: no readings	Purchased new probe + 2 backup probes
	3/18/05	3/30/05	13	Flooding upstream caused probe failure	Wait for waters to recede and replace probe - Data Discarded
	4/6/05	4/12/05	7	Programming Error	Reprogrammed and redeployed
	4/13/05	4/18/05	6	Power Failure: Premature battery failure	Start changing batteries on a regular schedule
Downstream	12/3/04	12/28/04	26	Neabsco was partially frozen in vicinity of probe	Ultimately probe was moved from post to dock
	3/31/05	4/4/05	5	Probe Failure	Maintenance Performed
	4/9/05	4/14/05	6	Power Failure: Premature battery failure	Start changing batteries on a regular schedule
	8/10/05	8/16/05	7	Probe Failure: no readings	Replaced Probe with backup

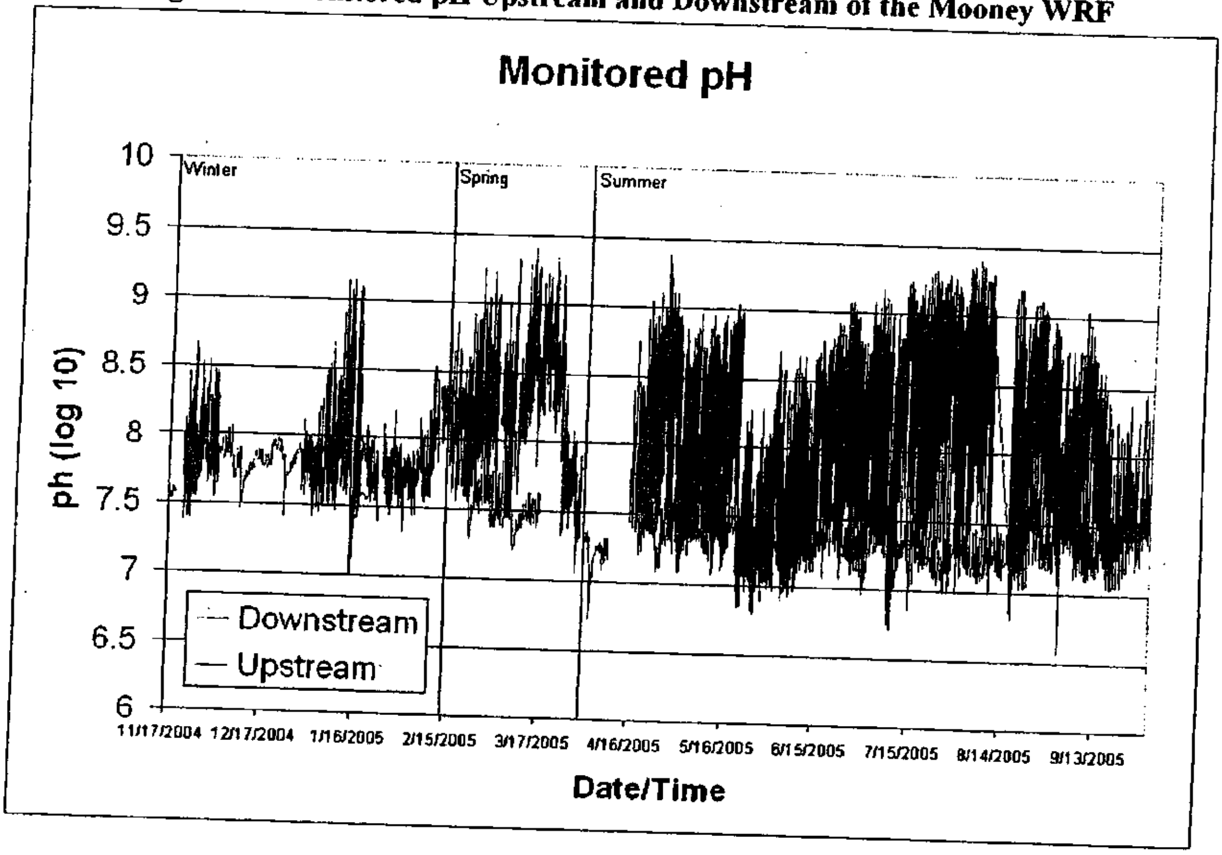
Anomalies or gaps in the data were also present in the grab samples; these typically were a result of access issues to a specific stream-segment. There were times when due to frozen conditions, low tide or very extensive vegetation not all segments could be sampled. The impact of these data gaps is minimal due to the other data that were collected.

The final anomaly that requires discussion is one of sampling time steps. As with all continuous meters these were not truly "continuous" but rather took readings at a prescribed time step. The most common time step throughout the sampling period was one hour, however there are periods during which data were collected at three minute, thirty minute and two hour intervals. During the data analysis it was necessary to have a uniform time step throughout the data record so that averages and percentiles could be calculated correctly. The data were normalized to a two-hour time step (the largest time step). This was done by removing data from time steps that were smaller than two hours; for instance if 30-minute readings were taken at 12:00, 12:30, 1:00, 1:30, and 2:00 then only the reading from 12:00 and 2:00 were used for the analysis. The removal of data was based strictly on the time it was taken, not on the values of pH or temperature recorded during the step.

2.2 pH Results

The pH was monitored upstream and downstream of the plant using continuous monitoring probes as described above. The results of this monitoring are shown in Figure 2 below. The pH was found to be highly variable at the downstream location, where Neabsco Creek meets the Potomac River. It was not uncommon to see pH swings of greater than one standard unit in a single day. An analysis was conducted correlating the pH with the tides and it was found that the high pH readings were coming in from the Potomac River rather then out from Neabsco Creek. In order words, the high pH readings were seen during or just after a high tide. This correlation was seen in other area waterbodies upstream and downstream of Neabsco Creek on the Potomac River. Relatively stable pH values were recorded in the upstream portion of Neabsco Creek which has a much lower tidal influence.

Figure 2 – Monitored pH Upstream and Downstream of the Mooney WRF

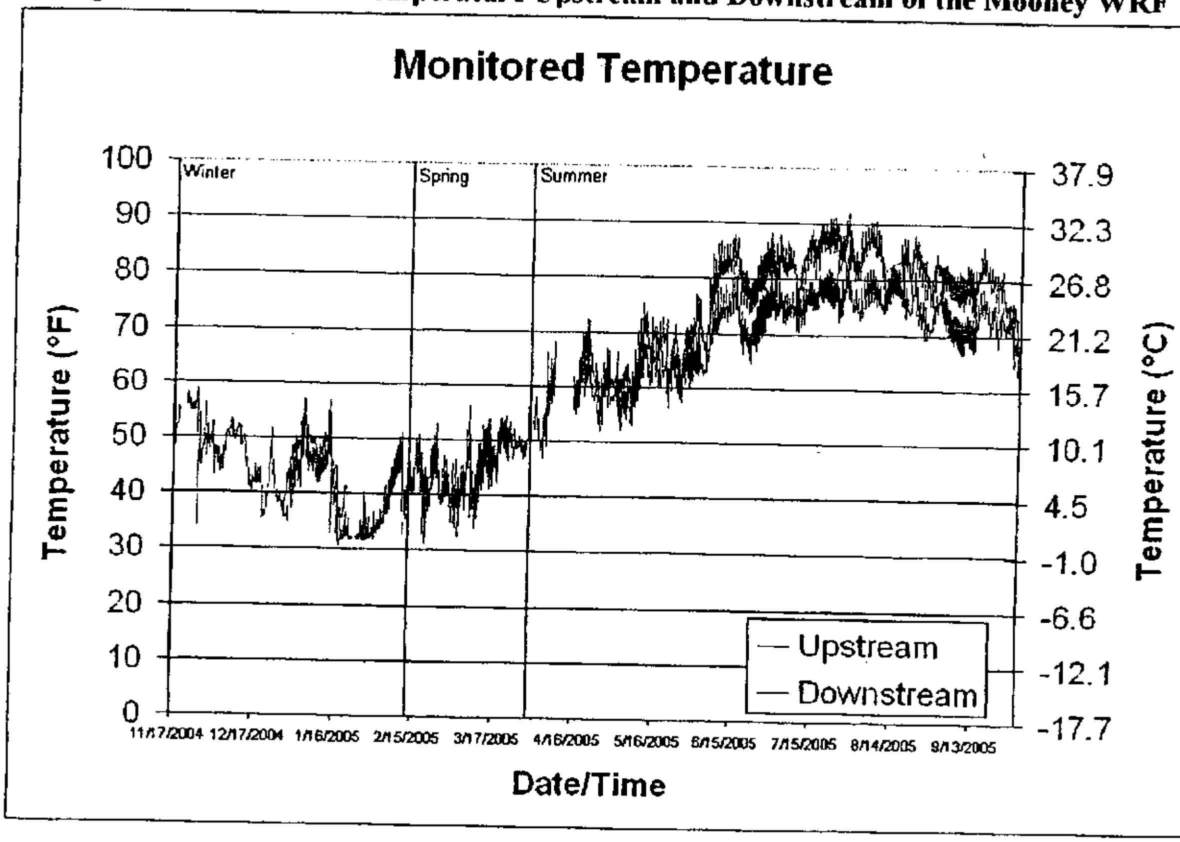


Virginia Water Quality Standards (VWQS) require that state waters (Class I-VI) maintain a pH between 6 and 9 (9 VAC 25-260-50). The 90th percentile pH at the downstream monitoring location is 8.93 for the entire monitored period. The unexpectedly high pH in the Potomac is a driving factor for lower Ammonia Wasteload allocations and permit limits, as will be discussed later in this report. A pH TMDL is currently under development for waters of the Potomac. It is the expectation of the Service Authority that once this TMDL is implemented, Ammonia permit relief may be considered, due to the correlation between pH and ammonia toxicity.

2.3 Temperature Results

Temperature was found to be much less variable than pH. The data show a trend reflective of the seasonal air temperature. Neabsco Creek, a relatively shallow waterbody, experienced especially high temperatures during summer months. Downstream temperatures above 90°F were recorded for a number of days in July and August. The 90[th] percentile temperature for these summer data is 30°C. Refer to Figure 3 below.

Figure 3 – Monitored Temperature Upstream and Downstream of the Mooney WRF



2.4 Grab Sample Results

In addition to the continuous pH and temperature results presented in the above graphs, grab samples were collected every two weeks at the locations indicated in Figure 1. These grab sample data were used to confirm the VIMS model results. Grab sample data are included in the appendix of this report.

3.0 Data Analysis

H.L. Mooney's current permit is based on a very limited data set collected primarily during daylight hours. As such, the permit uses a number of statistical assumptions as proxies to some of the criteria. Due to the expanded data set collected under this sampling program it is possible to develop a site-specific approach that does not rely on proxy-data. This approach and its results are outlined below.

3.1 Instream Chronic Criteria

Chronic Toxicity as defined by VWQS:

(9 VAC 25-260-140) "Chronic toxicity" means an adverse effect that is irreversible or progressive or occurs because the rate of injury is greater than the rate of repair during prolonged exposure to a pollutant. This includes low level, long-term effects such as reduction in growth or reproduction.

This criterion is further defined as:

(9 VAC 25-260-155b) The thirty-day average concentration of total ammonia nitrogen (in mg N/L) where early life stages of fish are present in freshwater shall not exceed, more than once every three years on the average2, the chronic criteria below:

.198

$$ChronicCriteriaConcentration = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \times MIN$$

(1.0414) (17.2929)

Where MIN = 2.85 or $1.45\text{x}10^{0.028(25\text{-}T)}$, whichever is less.
T = temperature in °C 1.043

(9 VAC 25-260-155c) thirty-day average concentration of total ammonia nitrogen (in mg N/L) where early life stages of fish are absent (procedures for making this determination are in subdivisions1 through 4 of this subsection), in freshwater shall not exceed, more than once every three years on the average3, the chronic criteria below:

$$ChronicCriteriaConcentration = \left(\frac{0.0577}{1+10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}}\right) \times 1.45\left(10^{0.028(25-MAX)}\right)$$

MAX = temperature in °C or 7, whichever is greater.

3.1.1 Thirty Day Averages

During the previous permit cycle it was not possible to calculate thirty-day criteria as required by Virginia Water Quality Standards. Therefore as a surrogate to the thirty-day values, the 50^{th} percentile temperature and pH values were used to calculate the instream criteria.

As a result of the continuous monitoring that was conducted under this sampling program it was possible to calculate thirty-day average concentrations. The procedure used was as follows; first instantaneous criteria were calculated for each of the time steps in the downstream data record based on the formulas provided in VWQS (above). Second three possible alternatives were considered when calculating the thirty-day criteria:

a) a thirty-day rolling average that included the current day and the previous 30 (30bck)
b) a thirty-day rolling average that included the current day then the next 30 (30fwd)
c) a thirty-day rolling average that included the current day, previous 15 and next 15 days (+/-15)

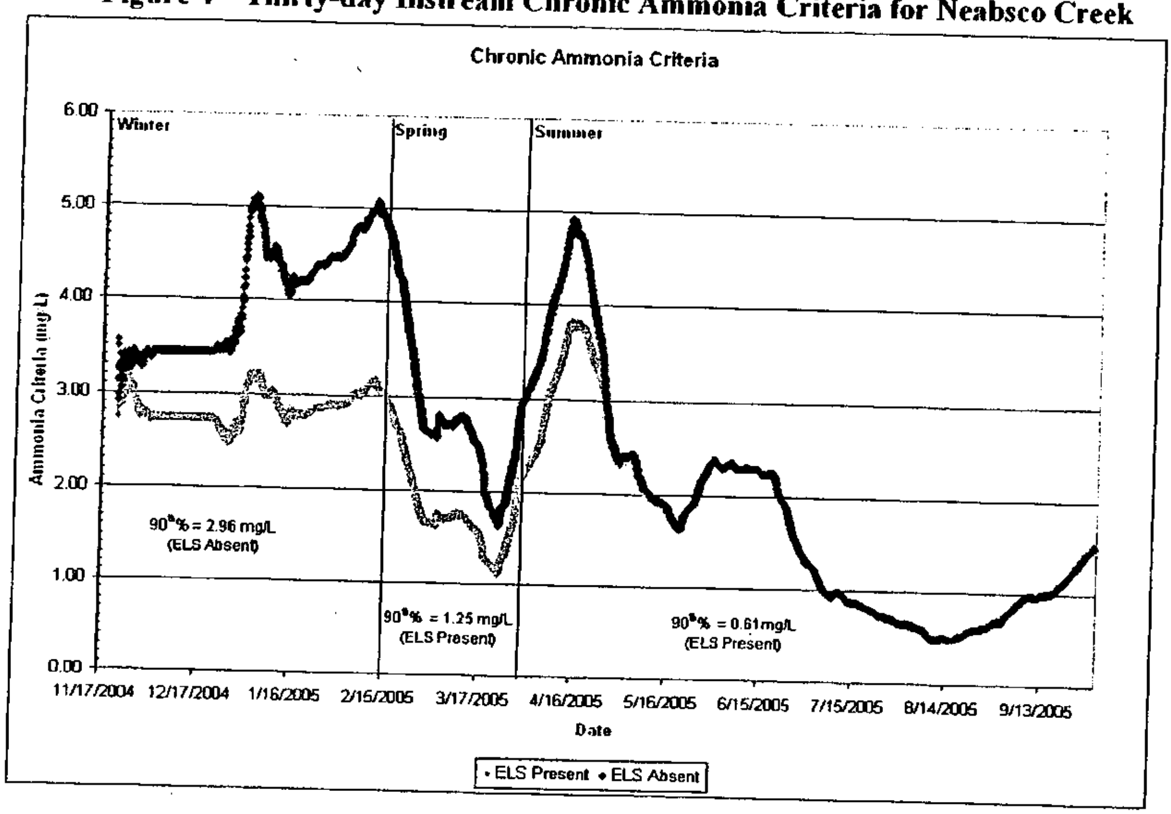
Next, the 90th percentile[1] values were calculated for each of the permit periods (winter, spring and summer) and for each of the thirty-day average alternatives (30bck, 30fwd, +/-15days). This procedure was conducted for both the Early Life Stages (ELS) present and absent status. Finally, *the most conservative value for each permit period was chosen as the instream chronic criteria for that permit period, based on the ELS classification.* The results are show in Table 2 below.

Table 2: 90th Percentile Chronic Criteria

Season/Permit Period	Criteria (mg/L)
Winter (November 1-February 14)	2.96
Spring (February 15- March 31)	1.25
Summer (April 1 - October 31)	0.61

For the winter period the most conservative value for instream chronic criteria was found using the 30fwd option. For the spring and summer periods the most conservative values were found using the 30bck option. Figure 4 below shows the calculated criteria for ELS present and absent based on the 30bck option.

Figure 4 – Thirty-day Instream Chronic Ammonia Criteria for Neabsco Creek



[1] Throughout this report when referring to ammonia criteria, "90th percentile" actually refers to the 10th percentile of data since the lower values are of interest.

3.2 Instream Acute Criteria

Acute Toxicity is defined by VWQS as:

(9 VAC 25-260-140) "Acute toxicity" means an adverse effect that usually occurs shortly after exposure to a pollutant. Lethality to an organism is the usual measure of acute toxicity. Where death is not easily detected, immobilization is considered equivalent to death.

This criterion is further defined as:

(9 VAC 25-260-155) The one-hour average concentration of total ammonia nitrogen (in mg N/L) in freshwater shall not exceed, more than once every three years on the average, the acute criteria below [Trout absent]:

$$AcuteCriterionConcentration = \left(\frac{0.411}{1+10^{7.204-pH}} + \frac{58.4}{1+10^{pH-7.204}} \right)$$

The acute criteria must be applied to the segments of Neabsco Creek immediately surrounding the outfall (segments 5 extending to segment 6 in the VIMS model) as this is the location that ammonia concentrations will be the highest due to less dilution. It was therefore necessary to determine the pH in this area to calculate the criteria. The VIMS model, a steady state, hydrogen ion based mixing model allowed the pH to be calculated at the various creek-segments based on the 90th percentile pH of the up and downstream continuous monitors and the 99th percentile of the plant effluent pH. The computed values for segment 6 were used to calculate the instream acute criteria.

Based on the VIMS model runs the 90th percentile acute criteria for the specified permit periods is as follows.

Table 3: 90th Percentile Acute Criteria

	Criteria (mg/L)	
Season/Permit Period	18 MGD	24 MGD
Winter (November 1-February 14)	15.96	18.15
Spring (February 15- March 31)	15.19	17.31
Summer (April 1 - October 31)	14.44	16.49

The instream criteria in segment six in large part reflected the relative low pH values present in the plant effluent. Plant effluent data from January 2001 through September 2005 indicates that the 99th percentile pH for plant effluent is 7.3.

3.3 Wasteload Allocations

Wasteload allocations (WLAs) are determined by multiplying instream criteria by a dilution/decay factor. A site-specific dilution factor has been calculated for chronic wasteload allocations at Neabsco Creek. A default dilution value of 2:1 is used for acute wasteload allocations based on the fact that the acute criteria are defined as one half of the final acute value for a specific toxic pollutant. Decay is then applied on top of the dilution factors to develop the dilution/decay factor.

The 2003 permit recognizes and incorporates a site-specific dilution and decay study conducted by Greeley and Hansen in 1997 titled *Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H.L Mooney Wastewater Treatment Plant* (1997 study). The current evaluation used this study as the basis for developing revised dilution/decay coefficients for the spring and winter permit periods (November 1 through March 31).

The 2003 permit states "Staff's opinion is that nitrification in ambient waters is negligible when temperature is ≤ 10°C." (Fact Sheet page 7). Based on this, decay was not considered during the winter and spring permit periods. The 90th percentile temperature for spring data collected at the downstream probe for this period was 10.4°C. During the winter period the 90th percentile temperature was found to be 11.6°C. These temperatures were applied to the formulas presented in the 1997 study, resulting in the chronic dilution/decay factors shown in Table 4 below.

Table 4 - Calculated Chronic Dilution/Decay Factors

	Temperature	18 MGD		24 MGD	
Season/Permit Period	(90th% - °C)	IWC	Dilution/Delay Factor	IWC	Dilution/Delay Factor
Winter (November 1-February 14)	11.6	24.94%	4.01	26.60%	3.76
Spring (February 15- March 31)	10.4	25.91%	3.86	27.70%	3.61
Summer (April 1 - October 31)*	30.11	18.90%	5.29	20.16%	4.96

*Dilution/Decay Factor from 2003 Permit

WLAs were calculated applying the dilution/decay factors to the instream criteria. The results are presented below in Table 5.

Table 5 - Calculated Wasteload Allocations (mg/L) for 18 and 24 MGD

	18 MGD		24 MGD	
Season/Permit Period	Acute WLA	Chronic WLA	Acute WLA	Chronic WLA
Winter (November 1-February 14)	31.92	11.86	36.29	11.12
Spring (February 15- March 31)	30.38	4.83	34.61	4.52
Summer (April 1 - October 31)	28.88	3.26	32.98	3.05

3.4 Proposed Discharge Limits

Using Version 2.0.4 of the Stats program (WLA.EXE) and the ammonia protocol detailed in Guidance Memo 00-2011, permit limits for the Mooney WRF were calculated from the WLA values. The 1.0 summer limit is required under the Potomac Embayment Standards. The water quality based standards are shown adjacent to the 1.0 requirement. Based on these analyses the proposed permit limits are presented in Table 6 below.

Table 6 – Proposed Permit Limits

	18 MGD		24 MGD	
Season/Permit Period	Weekly Limit	Monthly Limit	Weekly Limit	Monthly Limit
Winter (November 1-February 14)	NL	NL	NL	NL
Spring (February 15- March 31)	5.8	4.8	5.4	4.5
Summer (April 1 - October 31)	3.9	3.3 / 1.0	3.7	3.1 / 1.0

4.0 Conclusion

The sampling conducted under this program allowed the Prince William County Service Authority to collect sufficient data to develop site-specific permit limits. Under the 2003 permit this was not possible due to the limited nature of the data record. The nearly 10 months of continuous monitoring and biweekly grab samples allowed valid thirty-day chronic criteria to be computed and the VIMS model results to be confirmed. Additionally, the newly expanded data set, which included "around the clock" data (rather than those only collected during warmer day-light periods) allowed for the calculation of revised decay rates that we believe more accurately reflect rates throughout the calendar year and across permit periods.

The newly proposed permit limits are slightly more stringent that the 2003 permit limits but reflect a more scientifically based approach than was possible under the previous permit.

Appendix A: Neabsco Creek Grab Sample Data

Date	Temperature by Segment (°C)						
	2	4	5	6	7	8	9
09/14/04	22.2					25.2	25.4
09/23/04	19.3					20.7	20.9
09/30/04	19.9	21.8	21.8	21.6	22.3	21.9	21.9
10/21/04	15.0	15.3	15.2	14.8	14.6	14.5	14.5
10/28/04	13.6	14.0	14.9	14.3	14.3	14.3	14.1
11/16/04	9.9	11.4	12.5	9.0	8.9	9.2	9.0
12/02/04	8.3	8.1	10.0	14.6	11.0	9.0	7.9
12/14/04	5.6					5.6	6.3
01/26/05	4.3	3.3	4.7	6.9	1.2	0.5	0.3
04/11/05	15.3	16.4	16.4	16.6	17.0	17.3	16.8
05/26/05	14.9	16.0	16.4	16.2	16.3	16.6	16.5
06/01/05	17.3					21.1	20.9
06/23/05	21.7	23.4	23.1	23.6	24.1	26.2	25.4
07/05/05	23.7	26.6	26.2	26.8	26.8	27.4	27.8
07/21/05	25.5	27.1	27.8	28.1	28.1	29.6	30.6
08/11/05	24.4	25.5	26.1	26.9	28.1	28.7	29.1
08/22/05	24.2	27.2	27.6	28.1	28.3	28.9	28.8
09/06/05	21.1	24.3	24.8	24.7	24.7	25.1	25.1
09/21/05	22.1	23.4	23.9	23.8	24.2	25.2	25.2

Date	pH by Segment (standard units)						
	2	4	5	6	7	8	9
09/14/04	7.8					7.4	7.8
09/30/04	7.1	7.0	7.4	7.8	7.9	7.9	8.0
10/21/04	7.3	7.2	7.3	7.2	7.3	7.5	7.5
10/28/04	7.2	7.6	7.5	7.8	7.7	7.8	7.8
11/16/04	6.9	7.2	7.1	6.9	7.0	7.1	7.3
12/02/04	8.0	7.1	7.6	7.8	7.7	7.2	7.3
12/14/04	7.5					7.3	7.5
01/26/05	7.0	6.8	7.1	7.5	7.2	7.1	7.1
04/11/05	7.4	7.1	7.2	7.2	6.9	7.8	7.6
05/26/05	8.3	8.0	7.9	7.9	7.8	8.1	7.9
06/01/05	8.4					7.6	7.6
06/23/05	7.8	7.8	7.7	7.8	8.0	9.1	9.2
07/05/05	7.4	7.4	7.5	7.6	7.6	7.7	8.2
07/21/05	8.0	7.5	7.5	7.6	7.6	7.9	9.0
08/11/05	7.8	7.6	7.4	7.5	8.0	9.1	9.4
08/22/05	8.2	7.9	8.1	8.4	8.6	9.0	9.1
09/06/05	7.1	7.5	7.6	7.8	8.1	8.8	8.9
09/21/05	7.8	7.6	7.4	7.4	7.4	7.6	7.6

Note: Due to tidal conditions, some segments cannot be reached at all times. Therefore, there will be some blanks for segments 4 to 7.

Glenn Harvey
Prince William County Service Authority
4 County Complex Court
Raymond Spittle Building
Woodbridge, VA 22192

April 15, 2008

**Re: Calculation of Proposed Ammonia Limits for H.L. Mooney Water Reclamation Facility
VPDES Permit No. VA0025101**

Dear Mr. Harvey:

In accordance with your request, we have re-calculated the appropriate ammonia criteria, wasteload allocations, and proposed permit limits for the H.L. Mooney Water Reclamation Facility based on the following Seasons / Permit Periods:

Winter (Nov 1 - Jan 31)
Spring (Feb 1 - Mar 31)
Summer (April 1 - Oct 31)

The prior report on this topic, *Instream Monitoring Report for the Evaluation of Ammonia Effluent Limitations, 2005* used a Feb 15 date for the break between Winter and Spring permit periods.

The change in permit period results in small changes to the criteria, wasteload allocations and permit limit calculations in several tables in the report. Below are shown Tables 5 and 6, which detail the Calculated Wasteload Allocations and the Proposed Permit Limits.

Table 5: Calculated Wasteload Allocations (mg/L) for 18 and 24 MGD

	18 MGD		24 MGD	
Season/ Permit Period	Acute WLA	Chronic WLA	Acute WLA	Chronic WLA
Winter (Nov 1 - Jan 31)	31.92	13.55	36.30	12.71
Spring (Feb 1 - Mar 31)	30.38	4.90	34.62	4.58
Summer (April 1 - Oct 31)	28.88	3.23	32.98	3.03

Table 6: Proposed Permit Limits

	18 MGD		24 MGD	
Season/ Permit Period	Weekly Limit	Monthly Limit	Weekly Limit	Monthly Limit
Winter (Nov 1 - Jan 31)	NL	NL	NL	NL

Spring (Feb 1 - Mar 31)	5.9	4.9	5.5	4.6
Summer (April 1 - Oct 31)	3.9	3.2	3.6	3.0

Note that the current analysis did not rerun the mixing model used in the 1997 report, *Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H.L. Mooney Wastewater Treatment Plant*, to recalculate dilution and decay factors. The current analysis also did not rerun the VIMS model to recalculate acute criteria, as was done in the 2005 report.

Please let us know if we can provide additional information to you.

Sincerely,

Daniel Schechter, PE
Associate

TO: Alison Thompson, VDEQ
FROM: Daniel Schechter
DATE: June 2, 2009

RE: **Ammonia Limits for H.L. Mooney WRF based on 2005 - 2006 Neabsco Creek pH and Temperature Data**

Please find attached our analysis of the Neabsco Creek pH and Temperature data for the summer period for 2005-2006 and calculations of the Ammonia limits. As discussed, we have combined the 2005 data set collected by PWCSA and the 2006 data set collected by VDEQ.

The 30-day average chronic ammonia criteria was calculated using three methods (forward 30 days, back 30 days, and +/- 15 days) as was done in the prior Monitoring Report. The 90th percentile of the 30-day average chronic ammonia criteria was calculated, and the most stringent of the 3 methods above was selected to determine the appropriate instream criteria level.

Analysis of the 2005 data set and the 2006 data set are shown in separate columns of the attached spreadsheet, and the combined data is shown in the last column of the spreadsheet. There was a difference in the number of data points for each data set. The 2005 summer data was on a 2 hour interval while the 2006 summer data was on a 15 minute interval. To calculate an accurate 90th percentile for the 2005-2006 period, we performed the following data analysis:

1. The 30-day average ammonia criteria were calculated for each timestamp in 2005-2006 using all the data available.
2. The 2006 data was then extracted on a 2 hour interval.
3. The average, 50th percentile, and 90th percentile were calculated on the combined 2005-2006 data.

The analysis resulted in a 90th percentile chronic ammonia criteria (ELS present) of **0.69 mg/L** as N. Using the dilution factors shown in the draft permit of 5.29 (18 MGD) and 4.96 (24 MGD) results in a monthly limit of **3.7 mg/L (18 MGD)** and **3.4 mg/L (24 MGD)**. Using the STATS.EXE program to compute the weekly limit results in weekly limits of **4.4 mg/L (18 MGD)** and **4.1 mg/L (24 MGD)**.

Based on this analysis, we request the following weekly permit limits for ammonia:

	Weekly Limit
18 MGD	4.4 mg/L as N
24 MGD	4.1 mg/L as N

Please contact me if you have any questions or comments.

Daniel Schechter, P.E.
Associate
Greeley and Hansen

Attachment 9

Calculation of Summer Ammonia Permit Limits

	Data Source for Temperature and pH Data					
	2006 VDEQ, 90th percentile pH, Temp	2005 PWCSA, 90th percentile pH and Temp	VDEQ Draft Permit Values	2005 PWCSA Data, 90th percentile of 30 day average	2006 VDEQ Data, 90th percentile of 30 day average	2005 PWCSA + 2006 VDEQ Data, 90th percentile of 30 day average
Chronic Ammonia Criteria	0.29	0.21	0.46	0.61	0.88	0.69
Dilution/Decay Factor (18 MGD)	5.29	5.29	5.29	5.29	5.29	5.29
Dilution/Decay Factor (24 MGD)	4.96	4.96	4.96	4.96	4.96	4.96
Monthly Ammonia Limit (18 MGD)	1.53	1.12	2.43	3.23	4.66	3.65
Monthly Ammonia Limit (24 MGD)	1.43	1.05	2.28	3.03	4.36	3.42
Weekly Ammonia Limit (18 MGD)	1.83	1.34	2.92	3.87	5.59	4.38
Weekly Ammonia Limit (24 MGD)	1.72	1.26	2.74	3.63	5.24	4.11

VaFWIS - Department of Game and Inland Fisheries

38,36,39.0 -77,16,13.0
is the Search Point
[Submit] [Cancel]

Search Point
- **Change** to "clicked" map point
- **Fixed** at 38,36,39.0 - 77,16,13.0

Show Position Rings
Yes No
1 mile and 1/4 mile at the **Search Point**

Show Search Area
Yes No
2 Search distance miles radius

Search Point is at map center

Base Map Choices
Topography

Map Overlay Choices
Current List: Position, Search

Map Overlay Legend

Position Rings 1 mile and 1/4 mile at the Search Point

2 mile radius Search Area

Map Click: Pan | Map Scale: In Zoom Out | Refresh Browser Page | Screen Size: Small Size Big | Help

Point of Search 38,36,39.0 -77,16,13.0
Map Location 38,36,39.0 -77,16,13.0

Select **Coordinate System**:
- Degrees,Minutes,Seconds Latitude - Longitude
- Decimal Degrees Latitude - Longitude
- Meters UTM NAD83 East North Zone
- Meters UTM NAD27 East North Zone

Base Map source: USGS 1:100,000 topographic maps (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 18 NAD 1983 with left 297531 and top 4280836. Pixel size is 16 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixles. The map display represents 9600 meters east to west by 9600 meters north to south for a total of 92.1 square kilometers. The map display represents 31501 feet east to west by 31501 feet north to south for a total of 35.5 square miles.

Topographic maps and Black and white aerial photography for year 1990+-

Attachment 10

are from the United States Department of the Interior, United States Geological Survey.
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2014-01-08 10:48:41 (qa/qc December 5, 2012 8:04 - tn=512929 dist=3218 I)
$poi=38.6108333 -77.2702777

Commonwealth of Virginia Governor

Virginia Department of Game and Inland Fisheries

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VaFWIS Initial Project Assessment Report Compiled on 1/8/2014, 10:49:17 AM

Help

Known or likely to occur within a **2 mile radius around point 38,36,39.0 77,16,13.0 in 153 Prince William County, VA**

View Map of Site Location

493 Known or Likely Species ordered by Status Concern for Conservation (displaying first 24) (24 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
010032	FESE	II	Sturgeon, Atlantic	Acipenser oxyrinchus		BOVA
060006	SE	II	Floater, brook	Alasmidonta varicosa		BOVA
030062	ST	I	Turtle, wood	Glyptemys insculpta		Habitat
040129	ST	I	Sandpiper, upland	Bartramia longicauda		BOVA
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus		BOVA
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii		BOVA
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
010038	FC	IV	Alewife	Alosa pseudoharengus		BOVA
010045	FC		Herring, blueback	Alosa aestivalis		BOVA
100248	FS	I	Fritillary, regal	Speyeria idalia idalia		BOVA
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus	Yes	BOVA,BECAR,Habitat,BAEANests
060029	FS	III	Lance, yellow	Elliptio lanceolata		BOVA
030063	CC	III	Turtle, spotted	Clemmys guttata		BOVA
030012	CC	IV	Rattlesnake, timber	Crotalus horridus		BOVA
040372		I	Crossbill, red	Loxia curvirostra		BOVA
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius		BOVA
040319		I	Warbler, black-throated green	Dendroica virens		BOVA
040306		I	Warbler, golden-winged	Vermivora chrysoptera		BOVA
040038		II	Bittern, American	Botaurus lentiginosus		Habitat
040052		II	Duck, American black	Anas rubripes		BOVA
040213		II	Owl, northern saw-whet	Aegolius acadicus		BOVA
040105		II	Rail, king	Rallus elegans		BOVA,Habitat

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Water Division - Office of Water Permit Support
629 East Main Street Richmond, Virginia 23219

MEMORANDUM

Subject: Mooney WTP mixing analysis

To: Lyle Anne Collier, NRO

From: M. Dale Phillips, OWPS Dale

Date: February 18, 1997

Copies:

RECEIVED
FEB 20 1997
Northern VA. Region
Dept. of Env. Quality

I have completed a review of the technical memorandum that addresses the comments we had on the original study and provides additional material. I believe that the 1995 mixing study and this addendum provide estimates of exposure times that are sufficiently reasonable to provide the basis for the calculation of permit limits.

Call if you have questions or comments.

Attachment 11

Division of Engineering
& Wastewater

Richard C. Thoesen, P.E., Director

Prince William County Service Authority

H. L. Mooney Wastewater Treatment Plant
P. O. Box 2266 • 1851 Rippon Boulevard • Woodbridge, Virginia 22193-0266 • (703) 670-8101 • Fax (703) 670-8101

January 24, 1997

RECEIVED
JAN 24 1997
Northern VA. Region
Dept. of Env. Quality

Ms. Lyle Anne Collier
Virginia Department of Environmental Quality
Northern Virginia Regional Office
13901 Crown Court
Woodbridge, VA. 22193

Subject: Prince William County Service Authority
H. L. Mooney WWTP NPDES Permit Reissuance

Dear Ms. Collier:

We are pleased to provide the enclosed copies of the technical memorandum "Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H. L. Mooney Wastewater Treatment Plant". We believe this document provides a technically sound basis for winter time ammonia permit limits and also shows that the proposed Potomac Embayment Standards for ammonia are fully protective during the summertime.

Based on the analyses the requested instream waste concentrations (IWC) to use in assessing the chronic toxicity potential of substances and whole effluent are as follows:

Mooney WWTP Flow Conditions	IWC
@ 18 MGD (winter)	37.92%
(summer)	39.17%
@ 24 MGD (winter)	40.53%
(summer)	41.84%

The requested ammonia permit limits (in mg/L as N) for the Mooney WWTP are as follows:

Mooney WWTP Flow Conditions	Monthly Avg	Weekly Avg
18 MGD (winter)	5.35	6.58
(summer)	1.0	-
24 MGD (winter)	4.65	5.72
(summer)	1.0	-

These effluent limits for ammonia do not reflect any additional relief offered by the outcome of our proposed site-specific ammonia study. We will keep you appraised of our progress.

Please call Mark Kennedy (301-817-3700) or Steve Bennett (703-670-8101) if you have questions or if you would like to discuss these issues further.

Sincerely,

Richard C. Thoesen, P.E.
Director of Engineering & Wastewater

Attachments

cc: Robert Canham
Steve Bennett
Mark Kennedy (Greely & Hansen)

MK/RCT/RAC/pa

PRINCE WILLIAM COUNTY SERVICE AUTHORITY
BASIC ORDERING AGREEMENT, TASK ORDER NO. 14

Technical Memorandum

Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H.L. Mooney Wastewater Treatment Plant

Greeley and Hansen
January 1997

1. INTRODUCTION

The Prince William County Service Authority's (PWCSA) H. L. Mooney Wastewater Treatment Plant discharges treated effluent to Neabsco Creek, a constricted embayment of the Potomac River. The Plant effluent must meet the requirements of the Potomac Embayment Standards (PES) for ammonia in the summer months (April-October) and water quality-based ammonia standards in the winter months (November-March). Specifically, the PES require a 30-day average effluent concentration of 1 mg/L of ammonia as nitrogen (April through October) and the water quality-based standards are those published in the Virginia Water Quality Standards at VR 680-21-01.14.B.

The Virginia Department of Environmental Quality (VDEQ) developed preliminary permit limits for ammonia and initiated discussions with the PWCSA as part of the VPDES permit reissuance process. The purpose of this technical memorandum is to assist the PWCSA in developing appropriate water quality-based permit limits for ammonia and to address updates to the Neabsco Creek dilution model, near-field mixing and an evaluation of ambient pH and temperature data used in the ammonia permitting process for the Mooney WWTP.

2. Neabsco Creek Dilution Modeling - Update

A report on the first phase of the dilution study was submitted to the VDEQ for review and provided a technical basis for ammonia permit limitations necessary in the Mooney WWTP permit (Greeley and Hansen and Limno-Tech, Inc., 1995). The report predicted dilution rates for the Mooney WWTP effluent in the various Neabsco Creek Model sections, the times of exposure for a drifting organism and the length of time necessary to flush and replace the receiving water in the vicinity of the Mooney WWTP outfall.

VDEQ reviewed the report and made the following observations (M. Dale Phillips, 1996):

a. The Neabsco Creek Model assumes complete mix in each of the model segments and therefore cannot be used to define the extent of acute physical mixing area (PMA).

b. The hydraulic behavior of the system [Neabsco Creek] is well known because the model was calibrated and verified using dye study results.

c. Hydraulic flushing time and drifting organism exposure predictions are a valid means of defining the duration of exposure for chronic toxicity.

d. Flushing time in the lower segments of Neabsco Creek [nearer to the Potomac River] need to be included in the evaluation before approval of the results for chronic toxicity may be made.

VDEQ staff requested that the Dale City WWTP flow be considered as a pollutant source equivalent to the Mooney WWTP. Model runs were subsequently run incorporating these additional factors in order to fully address VDEQ concerns.

2.1 Near-Field Mixing Evaluation

The purpose of the near-field mixing evaluation is to confirm that rapid and complete mixing takes place within model segments 5 and 6 of Neabsco Creek and to establish, if possible, the extent of an acute physical mixing area.

The following elements are incorporated into a CORMIX (version 3.1) analysis of the near-field mixing.

- Maintaining the Mooney WWTP flows at 18 and 24 MGD
- Varying mannings "n" factor (for friction) to assess the effect of aquatic vegetation on mixing characteristics.
- Summer (7Q10=0.0 MGD) and winter (7Q10=1.03 MGD) ambient upstream flow
- Dale City WWTP flow equal to 6 MGD
- Mixing plume buoyancy due to temperature effects
- Additional inputs necessary for the model as shown in Attachment 1

The predicted distance and travel time to achieve complete mixing for each scenario is as follows:

Complete Mixing Distance and Travel Time
for H.L. Mooney WWTP Discharge to Neabsco Creek.

Seasonal and tidal conditions	Mooney @ 18 MGD		Mooney @ 24 MGD	
	Distance (meters)	Time (hours)	Distance (meters)	Time (hours)
Summer				
No tidal movement	131	1.3	235	2.4
With tidal movement	70	0.8	70	0.6
Winter				
No tidal movement	185	5.9 (1)	70	0.9
With tidal movement	69	0.9	77	1.0

Note: (1) This predicted travel time is inconsistent with other results and may be overestimated.

The following conclusions are based on the results of the near-field simulations:

a. For both summer and winter conditions, CORMIX3 confirms that the Mooney WWTP effluent completely mixes across Neabsco Creek within a maximum distance of 69 to 235 meters, depending on the season, tidal conditions and effluent flow rate.

b. The predicted maximum complete mix distance is less than the length of the VIMS Neabsco Creek Model segments 5 and 6, which are 360 and 490 meters respectively. Therefore, the VIMS Neabsco Creek Model complete mix assumption is valid.

c. The relationship between the travel times are generally correct (except for one winter simulation noted above) and the times are less than or equal to one hour when tidal movement is considered.

d. Varying Mannings "n" friction factor had little or no effect on the near field mixing characteristics. Therefore, the presence of aquatic vegetation should not significantly affect mixing characteristics or the extent of the physical mixing area.

2.2 Updated Neabsco Creek Dilution Analysis

The Neabsco Creek Model was applied to evaluate dilution in Neabsco Creek in the previous report. This model is rerun here to respond to VDEQ comments and incorporates the following changes:

- Maintaining the Mooney WWTP flows at 18 and 24 MGD.
- Separate summer (7Q10 = 0.0 MGD) and winter conditions (7Q10 = 1.03 MGD) as provided by VDEQ.
- Dilution with settling and without settling.
- Dale City WWTP flow equal to 6.0 MGD with the same pollutant concentrations as the Mooney WWTP (i.e. no dilution from the Dale City flow).

The results of the model are presented in Table 1 (Dilution Rates) and in Table 2 (Exposure Times). These updated results do not indicate as much dilution available as in the previous model runs. They do, however, provide a basis for dilution for both the Dale City and Mooney WWTPs based on drifting organism exposure.

2.3 Drifting Organism Exposure Analysis for Chronic Toxicity Evaluation

Neabsco Creek is a tidally flushed, constricted embayment of the Potomac River. The creek is neither free flowing nor a deep tidal water and therefore falls outside the normal pattern described in VDEQ guidance. A drifting organism exposure time of two days (instead of four days) was used in accordance with VDEQ guidance to judge the acceptability of an effluent with regard to chronic toxicity. This approach was discussed in detail in the previous report (Greeley and Hansen and Limno-Tech, Inc., 1995).

VDEQ requested in their review of the previous report, that the Dale City WWTP flow be included in the model as a pollutant source equal to the Mooney WWTP. The updated Neabsco Creek dilution analysis incorporates this recommendation. However, this modification results in the model describing not only the Mooney WWTP impact but the impacts of the Dale City WWTP as well. Since there are no other point source discharges to Neabsco Creek, the updated model results provide a basis for a wasteload allocation for the entire water body. As such, it is appropriate to consider a drifting organism exposure to chronic toxicity for a full four (4) days rather than two (2) days. The safety factor to account for additional discharges need not be maintained since both dischargers to Neabsco Creek have been incorporated into the same model.

The method to calculate the average effluent exposure of a drifting organism is to multiply the dilution factor in each segment (in terms of percent effluent) by the time the organism is resident in that segment. The products of segment dilutions and exposure times are then added and the sum is divided by the cumulative exposure for the organism -- held to four days for the purposes of chronic toxicity evaluations. The calculations for the Mooney WWTP are in Attachment 2 and the results are as follows:

Average Four-Day Effluent Exposure for a Drifting Organism (as percent effluent)		
Season	Mooney @ 18 MGD	Mooney @ 24 MGD
Apr - Oct	39.17% (1)	41.84% (2)
Nov - Mar	37.92% (1)	40.53% (3)

Notes: (1) Four-day exposure terminates in model segment 9.
(2) Four-day exposure terminates in model segment 10.
(3) Four-day exposure terminates just inside model segment 11.

The 4-day exposure in each scenario begins in model segment 5 and terminates in model segments 9, 10 or 11 depending on the ambient conditions and WWTP flow. This means that the drifting organism, beginning at segment 5 (the Mooney discharge) will drift to segments 9, 10 or 11 in four days. The exposures shown above (as percent effluent) are for conservative substances which do not settle or decay and are appropriate for whole effluent toxicity testing evaluations. However, ammonia is not a conservative substance and undergoes decay as it is converted into different nitrogen forms. A first order decay rate coefficient of 0.2 day^{-1} was derived by the Virginia Institute of Marine Sciences (VIMS) and used in the original Neabsco Creek model to predict this ammonia decay. This original decay rate coefficient was based on an ambient temperature of 20°C but can be adjusted to other temperatures using VDEQ guidance (OWRM Guidance memo No. 93-015, Amendment No. 1 -- Mixing Zones, page 18).

VDEQ policy calls for consideration of ammonia decay only in the summer months but not in the winter. The reason for the policy is that ammonia decay is reduced with temperature. However, VDEQ guidance also bases the water quality standard for ammonia on the 90th percentile temperature, which for Neabsco Creek is 18.8°C. The ammonia decay rate coefficient has been reduced here for the 90th percentile temperature of the winter months. The combination of conservative factors including the biased high pH is reason to consider inclusion of a temperature adjusted decay as a reasonable basis for permit calculation. Adjusting the coefficient to the 90th percentile temperature of Neabsco Creek (i.e. 18.8°C) results in a new coefficient of 0.1824 day^{-1}. Applying this rate of decay for the four days of exposure would reduce the effluent exposure for ammonia as follows:

Average Four-Day Ammonia Exposure for a Drifting Organism (as percent effluent)				
Season	Mooney @ 18 MGD		Mooney @ 24 MGD	
	IWC	Dilution Rate	IWC	Dilution Rate
Apr - Oct	18.89%	5.29	20.18%	4.96
Nov - Mar	18.28%	5.47	19.54%	5.12

These ammonia exposure concentrations should be used to calculate the ammonia wasteload allocation for the Mooney WWTP.

3. Development of Ammonia Wasteload Allocations and Permit Limitations

The wasteload allocation can be calculated by dividing the water quality standard by the effective dilution factor expressed as percent effluent. These latter dilution factors have been determined in the previous section. The selection of the appropriate water quality standard for ammonia depends on the ambient pH and temperature of the receiving water.

3.1 Selection of ambient pH and temperature values and the resulting ammonia water quality standard

Several sets of pH and temperature data have been identified in the permitting process by VDEQ. These data are from the Mooney WWTP effluent, Neabsco Creek 50 feet above the Mooney WWTP outfall, Neabsco Creek at the Route 1 bridge and midway into Neabsco Bay. Other pH data useful to the permitting process are at Belmont Bay and at stations in the nearby Potomac River shown in Figure 1. VDEQ guidance requires the use of 90th percentile data to evaluate ammonia toxicity. The 90th percentiles of available pH data are as follows:

Data Source	Number of Data Points	90th Percentile pH Value
Mooney WWTP Effluent	1645	7.23
Neabsco Creek 50' above the Mooney WWTP Outfall	234	7.83
Neabsco Creek @ Route 1	141	7.5
Neabsco Bay	214	9.7
Belmont Bay	206	9.9
Woodrow Wilson Bridge (Potomac)	33,684	8.0
Dogue Creek (Potomac)	579	8.1
Indian Head, MD (Potomac)	1176	8.2
Quantico Creek (Potomac)	757	8.1
Aquia Creek (Potomac)	585	8.0

From the pH data available, the following observations and conclusions should be made:

a. Potomac River 90th percentile pHs are consistent both above and below Neabsco Bay.

The data indicate mild pH fluctuations depending on the time of year, with higher pHs measured in the summer months due to increased photosynthetic activity. The Woodrow Wilson Bridge Station was measured continuously from 1989-1992 and demonstrated the diurnal pattern of pH fluctuations due to photosynthetic activity.

b. <u>Neabsco and Belmont Bays, both adjacent to the Occoquan Bay, have the highest 90th percentile pHs.</u>

Neabsco and Belmont Bays are shallow embayments of the Potomac River. Their shallow depth permits higher temperatures and more light penetration to support aquatic plant life. The pH swings in these waterbeds are reflective of this increased photosynthetic activity. Clearly, if the ambient pH of these bays were consistently above 9.0, the aquatic life in these and adjacent water bodies would be adversely affected. The highest pH values typically occur in the early to mid-afternoon which is when sampling usually occurs. If pH sampling were continuous, including night and early morning readings, the 90th percentile values for these bays would be shown to be lower. This high pH bias adds a level of conservatism to the analysis of the data.

c. <u>Neabsco Creek 90th percentile pHs are lower than the 90th percentile pHs in the</u> embayments and the Potomac River.

The low dilution predicted in the Neabsco Creek (i.e. the high percentage of effluent in the creek) indicates that effluent characteristics will influence the creek more than the ambient water available from the incoming stream and tidal movements. The pH data bears this out with the WWTP effluents effectively buffering the ambient Neabsco Creek pH. The Neabsco Creek 90th percentile pH is 7.83 (not greater than 9.0 as in Neabsco Bay) and is greatly influenced by the effluents of the Dale City and Mooney WWTPs due to the minimal dilution available. As the Mooney WWTP expands and increases its flow to 18 and 24 MGD, the influence of the treated effluents on pH will also increase. It is important to note that photosynthetically induced diurnal pH fluctuation also occurs in Neabsco Creek, but with a lower amplitude due to the buffering effect of the WWTP effluents. However, it can be expected that the Neabsco Creek pH of 7.83 is also biased high due to the time of sampling.

The ambient pH and temperature selected to determine the ammonia water quality standard should reflect the conditions of the water body in question. Since the drifting organism will remain within Neabsco Creek for almost the entire four days, the chronic ammonia water quality standard, which is applied as a four-day exposure, should be based on the available Neabsco Creek pH and temperature data. Therefore the Neabsco Creek pHs (7.82 for summer and 7.86 for winter) and temperatures (27°C for summer and 18.8°C for winter) can be used to calculate the chronic ammonia criteria. See p 7a + 7b for the derivation of these values Jac

The higher pH values of Neabsco Bay should not be used to calculate the chronic ammonia criteria for the following reasons:

Calculating the Exposure Concentration for a Drifting Organism in Neabsco Bay

(Temperature Data from G&H, 2005; Other information is taken directly from G&H, 1997)

Winter Conditions (11/1 to 2/14), Mooney @ 18 MGD

Segment	Dilution	%Effluent (1/dilution)	Exposure Time (days)	Cumulative Exposure (days)	Exposure Product
5	1.4	0.714	0.19	0.19	0.136
6	1.6	0.625	0.47	0.66	0.294
7	2	0.500	0.28	0.94	0.140
8	2.7	0.370	1.2	2.14	0.444
9	3.7	0.270	1.86	4	0.503
Total					1.517

Effluent Exposure	37.92%
Temperature (degrees C)	11.6
Ammonia Decay	0.1050
Ammonia Exposure	**24.91%**
Dilution Ratio	**4.01**

Winter Conditions (11/1 to 2/14), Mooney @ 24 MGD

Segment	Dilution	%Effluent (1/dilution)	Exposure Time (days)	Cumulative Exposure (days)	Exposure Product
5	1.3	0.769	0.16	0.16	0.123
6	1.4	0.714	0.38	0.54	0.271
7	1.7	0.588	0.23	0.77	0.135
8	2.3	0.435	0.97	1.74	0.422
9	3.1	0.323	1.9	3.64	0.613
10	5.3	0.189	0.28	3.92	0.053
11	19.8	0.051	0.08	4	0.004
Total					1.621

Effluent Exposure	40.53%
Temperature (degrees C)	11.6
Ammonia Decay	0.1050
Ammonia Exposure	**26.63%**
Dilution Ratio	**3.76**

Spring Conditions (2/15 to 3/31), Mooney @ 18 MGD

Segment	Dilution	%Effluent (1/dilution)	Exposure Time (days)	Cumulative Exposure (days)	Exposure Product
5	1.4	0.714	0.19	0.19	0.136
6	1.6	0.625	0.47	0.66	0.294
7	2	0.500	0.28	0.94	0.140
8	2.7	0.370	1.2	2.14	0.444
9	3.7	0.270	1.86	4	0.503
Total					1.517

Effluent Exposure	37.92%
Temperature (degrees C)	10.4
Ammonia Decay	0.0955
Ammonia Exposure	**25.88%**
Dilution Ratio	**3.86**

Spring Conditions (2/15 to 3/31), Mooney @ 24 MGD

Segment	Dilution	%Effluent (1/dilution)	Exposure Time (days)	Cumulative Exposure (days)	Exposure Product
5	1.3	0.769	0.16	0.16	0.123
6	1.4	0.714	0.38	0.54	0.271
7	1.7	0.588	0.23	0.77	0.135
8	2.3	0.435	0.97	1.74	0.422
9	3.1	0.323	1.9	3.64	0.613
10	5.3	0.189	0.28	3.92	0.053
11	19.8	0.051	0.08	4	0.004
Total					1.621

Effluent Exposure	40.53%
Temperature (degrees C)	10.4
Ammonia Decay	0.0955
Ammonia Exposure	**27.67%**
Dilution Ratio	**3.61**

Calculating the Exposure Concentration for a Drifting Organism in Neabsco Bay

(Temperature Data from G&H, 2005; Other information is taken directly from G&H, 1997)

Formulas Used

Effluent_Exposure = Exposure_Product / Cumulative_Exposure
Ammonia_Decay = 0.2 x 1.08 ^ (T - 20) where T = Temp in deg C
Ammonia_Exposure = Effluent_Exposure x e^(-Ammonia_Decay * Cumulative_Exposure)
Dilution_Ratio = 1 / Ammonia_Exposure

References:

Greeley and Hansen, 1997. "Near Field Mixing Analysis and Ammonia Permitting Evaluation for the H.L. Mooney Wastewater Treatment Plant"

Greeley and Hansen, 2005. "Prince William County Service Authority, H.L. Mooney Water Reclamation Facility, VPDES Permit No. VA0025101, In-Stream Monitoring Report for the Evaluation of Ammonia Effluent Limitations."

POTOMAC EMBAYMENTS

WASTELOAD ALLOCATION STUDY

FINAL REPORT, VOLUME I

Prepared for

Commonwealth of Virginia

State Water Control Board

2111 North Hamilton Street

Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission

7630 Little River Turnpike, Suite 400

Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by

Camp Dresser & McKee

June 12, 1987

Attachment 13

POTOMA^ ~"BAYMENTS WASTELOAD ALLOCATION ~"DY
FINAL REPORT, VOLUME I:
Study Methodology, Water Quality Goals,
and Loading and Debugging of Computer Models

EXECUTIVE SUMMARY

The initial stages of the Potomac Embayments Wasteload Allocation Study lay the groundwork for the technical analyses that are performed to develop recommended effluent limits for point source discharges to seven Virginia embayments of the Potomac Estuary. First, modeling tools to be used in the study are obtained and tested. Next, a regionally consistent methodology for wasteload allocation analysis is developed. Finally, water quality goals are developed for use as evaluation criteria in screening wasteload allocation alternatives in later stages of the study.

Embayment hydrodynamics and water quality models developed by the Virginia Institute of Marine Science (VIMS) are obtained from VIMS and loaded onto the mainframe computer system used by NVPDC. The computer codes are modified as necessary to ensure successful operation on the system. The model codes are further modified to enhance their capability and, in several cases, to correct minor errors.

The regionally consistent methodology established for the study defines the modeling approach and the general procedures for establishing design conditions, defining water quality goals, performing sensitivity studies, and completing final wasteload allocation analyses. As part of the methodology, specific data for computer model application are developed, including nonpoint loadings, Potomac main stem boundary conditions, and design values for tidal ranges, streamflows, water temperature, and solar radiation.

The water quality goals established for the study focus primarily on concentrations of dissolved oxygen and chlorophyll-a. The selected dissolved oxygen goals are the Virginia state water quality standards of 5.0 mg/L daily average and 4.0 mg/L daily minimum. Chlorophyll-a goals are developed based on the concept of no further deterioration of existing conditions, which is consistent with the State's antidegradation policy. Specific chlorophyll-a goals are established for each embayment, primarily based on computer model simulations that show the impacts of point source loadings and Potomac main stem boundary conditions on chlorophyll-a concentrations throughout the embayment.

CONTENTS

CONTENTS (CONTINUED)

POTOMAC EMBAYMENTS
WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME II

Prepared for

Commonwealth of Virginia
State Water Control Board
2111 North Hamilton Street
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission
7630 Little River Turnpike, Suite 400
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by
Camp Dresser & McKee

June 12, 1987

POTOMAC EMBAYMENTS
WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME III

Prepared for

Commonwealth of Virginia
State Water Control Board
2111 North Hamilton Street
Richmond, Virginia 23230

Prepared by

Northern Virginia Planning District Commission
7630 Little River Turnpike
Annandale, Virginia 22003

(Staff Technical Analysis)

With Technical Assistance Provided by

Camp Dresser & McKee

June 30, 1988

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY
FINAL REPORT, VOLUME III:

Sensitivity Studies and Final Analyses for the
Four Mile Run, Hunting Creek, and Neabsco Creek Embayments

EXECUTIVE SUMMARY

In accordance with the regionally consistent methodology presented in the Volume I final report, NVPDC and CDM conduct sensitivity studies and final analyses for the Four Mile Run, Hunting Creek, and Neabsco Creek embayments. Modeling tools developed by the Virginia Institute of Marine Science are used to predict the embayment water quality impacts of alternative treatment plant wasteloads. The modeling results are compared to water quality goals developed and presented in the Volume I final report to determine appropriate treatment plant effluent limits.

The sensitivity studies predict the extent to which embayment water quality would be affected by changes in parameters such as treatment plant loading, Potomac main stem boundary conditions, benthic flux rates, and treatment plant discharge location. After comparing the modeling results to the appropriate water quality goals, several different wasteload allocation alternatives for each embayment are selected for further analysis.

For the alternatives selected in the sensitivity studies, the final analyses include a comparison of wastewater treatment costs and of pollutant exchange between the embayment and the Potomac main stem. In addition, analyses of seasonal treatment limits for phosphorus and unoxidized nitrogen are conducted. The analysis of seasonal phosphorus removal is limited by a lack of data; as a result, no recommendations are made regarding the feasibility of seasonal phosphorus limits. The analyses for the Hunting Creek and Four Mile Run embayments incorporate the results of a recently completed Metropolitan Washington Council of Governments study of dissolved oxygen in the upper Potomac Estuary.

Based on the sensitivity studies and final analyses, the following effluent limits for dissolved oxygen (DO), 5-day carbonaceous biochemical oxygen demand (CBOD5), total Kjeldahl nitrogen (TKN), and total phosphorus (TP) are recommended for protection of embayment water quality:

EMBAYMENT	TREATMENT PLANT	PLANT FLOW (MGD)	RECOMMENDED EFFLUENT CONCENTRATION (mg/l) DO	CBOD5	TKN	TP
Four Mile Run	Arlington	40.0	6.0	10.0	---	1.00
Hunting Creek	Alexandria	54.0	7.6*	3.0	---	1.00
				-or-		
			7.6*	10.0	1.0**	1.00
Neabsco Creek	Dale City #1	4.0	6.0	10.0	---	1.00
	Dale City #8	2.0	6.0	10.0	---	1.00
	Mooney	20.0	6.0	10.0	---	1.00

*April 1 through October 31 only; limit of 6.0 mg/L November 1 through March 31

**April 1 through October 31 only; no TKN limit November 1 through March 31

To protect the main stem of the Potomac Estuary, an interim total phosphorus limit of 0.18 mg/l is regionally accepted as presented in the Interim Control Policy of the 1986 Supplement to the Metropolitan Washington 208 Plan. Therefore, at the present time, the more restrictive constraint on total phosphorus is the 0.18 mg/l limit for protection of the main stem of the Potomac. As indicated in the 208 Plan Supplement, long-term Potomac studies now under way will better define the total phosphorus limits required for protection of the Potomac main stem.

Division of Engine g
& Wastewater

Richard C. Thoesen, P.E., Director

Prince am County Service Authority

H. L. Mooney Wastewater Treatment Plant
P.O. Box 2266 • 1851 Rippon Boulevard • Woodbridge, Virginia 22193-0266 • (703) 670-8101 • Fax (703) 590-5877

November 21, 1997

RECEIVED
NOV 21 1997
Northern VA. Region
Dept. of Env. Quality

Mr. Thomas A. Faha
Department of Environmental Quality
Northern Virginia Regional Office
13901 Crown Court
Woodbridge, Virginia 22193

Re: H. L. Mooney AWWTP - Draft VPDES Permit VA0025101

Dear Mr. Faha:

On behalf of the Service Authority, I thank you for meeting with us on November 19, 1997, to discuss our concerns with the Draft VPDES Permit. The purpose of this letter is to document our remaining concerns and to support our request that the permit be revised.

Weekly Average Ammonia

We disagree with the application of the 1.5 ratio utilized for the weekly average. Although this empirical ratio is normally used for a weekly standard, it is based on a monthly water quality standard. The ammonia nitrogen standard for the H. L. Mooney AWWTP is a voluntary standard and is technology based, not water quality based. Accordingly, the weekly standard should be water quality based and doing so will fully protect the tributary. The water quality standards are as follows:

1. The toxicity based evaluations included in the permit Fact Sheet as Attachment 13.

2. The wasteload allocation evaluations conducted for Neabsco Creek by NVPDC dated June 30, 1988 (copy attached). These studies show that the dissolved oxygen standard will be set at ammonia discharges of 20 mg/l.

Evaluation of the foregoing studies shows that toxicity and dissolved oxygen standards for ammonia as nitrogen will be met with the limits recommended in Attachment 13 as follows:

	Weekly Average - mg/l	
Parameter	18 mgd	24 mgd
Ammonia as nitrogen (April - October)	5.0	4.7

We request that these limits be included in the draft permit.

Metals Monitoring

We also discussed analyses for metals monitoring (Appendix A) during our November 19, 1997 meeting. The Service Authority's position is that only analytical methods included in 40 CFR Part 136 or approved by the USEPA Regional Administrator with the concurrence of the DEQ Director may be used. We disagree, therefore, with DEQ's intention to include unapproved 200 and 1600 series analytical methods in our VPDES permit.

We appreciate your time and consideration of our comments and the opportunity to review the draft permit.

Sincerely,

Richard C. Thoesen
Director of Engineering & Wastewater

Attachment

cc: Steve Bennett
Bob Canham
Ron Bizzarri

RCT/ls

POTOMAC EMBAYMENTS WASTELOAD ALLOCATION STUDY

FINAL REPORT, VOLUME III:

SENSITIVITY STUDIES AND FINAL ANALYSES FOR THE FOUR MILE RUN, HUNTING CREEK AND NEABSCO CREEK EMBAYMENTS

A Staff Technical Analysis

Prepared for
STATE WATER CONTROL BOARD

Prepared by
NORTHERN VIRGINIA PLANNING DISTRICT COMMISSION

with Technical Assistance Provided by
CAMP DRESSER & McKEE

JUNE 30, 1988

10.0 FINAL WLA ALTERNATIVE ANALYSIS FOR NEABSCO CREEK

10.1 EMBAYMENT DESIGN CONDITIONS

In addition to the established low flow and high temperature design conditions, three other conditions are set for the final analysis of the WLA alternatives. They include: Potomac Estuary boundary conditions, benthic flux rates, and discharge location.

Changes to the Potomac Estuary boundary chlorophyll-a concentration from 80 ug/L (design conditions) to 100 and 50 ug/L did not significantly impact the daily minimum or minimum daily average DO concentrations which occurred for the most part in the uppermost segments of Neabsco Creek. These changes were analyzed with the Interim Control Decision with and without nitrification. The 80 ug/L chlorophyll-a goal for the downstream zone is violated only when a Potomac Estuary boundary of 100 ug/L is assumed, and the violation occurs regardless of the total phosphorus effluent concentration for the three WWTPs that discharge to Neabsco Creek. The chlorophyll-a goal of 30 ug/L in the upstream zone 2 is not exceeded for the increased boundary condition of 100 ug/L. Therefore, the design chlorophyll-a boundary concentration of 80 ug/L at the Potomac Estuary is used for the final analysis.

Benthic flux rates for ammonia and SOD were analyzed for ± 30 percent of the calibrated values. The embayment response of dissolved oxygen concentrations was not sensitive to these changes in benthic flux rates and thus the calibrated rates are used in the final analysis.

The sensitivity of the embayment water quality to different treatment plant locations was performed for the Mooney treatment plant. Different locations for the Dale City treatment plants were not analyzed. The analysis showed that the upstream discharge location reduced the daily minimum and minimum daily average dissolved oxygen concentrations below the values at the present discharge location. At the upstream location the daily average dissolved oxygen standard was violated. The minimum dissolved oxygen values at the downstream location were similar to the values at the present discharge location. Therefore, the final analysis includes wasteload allocation investigations at the present discharge location for the Mooney wastewater treatment plant.

In summary, the final alternatives are analyzed with the design Potomac Estuary boundary condition, calibrated benthic flux rates and at the present discharge location.

10.2 WLA ALTERNATIVES

The wasteload allocation alternatives include the following:

1. Interim Control Decision without nitrification (TP = 0.18 mg/L), and

2. Interim Control Decision without nitrification with an effluent total phosphorus of 1.0 mg/L.

Alternatives 1 and 2 are selected based on the results of the sensitivity study. Table 10-1 presents the effluent concentrations for the two WLA alternatives. The alternatives only differ in the total phosphorus concentrations which are presented in the table as organic phosphorus and orthophosphorus.

The impact of the two wasteload allocation alternatives on the dissolved oxygen and chlorophyll-a in the embayment are presented in Table 10-2. The state's dissolved oxygen standards and the chlorophyll-a goals established as part of this study are met by both alternatives. At a discharge of 20.0 mgd for Mooney and 6.0 mgd for the two Dale City plants combined, the minimum daily average DO is 5.3 mg/L and the daily minimum DO is 4.6 mg/L for both alternatives. The Interim Control Decision alternatives are modeled with a CBOD5 of 10.0 mg/L, ammonia of 20.0 mg/L and dissolved oxygen of 6.0 mg/L.

TABLE 10-1

EFFLUENT CONCENTRATIONS OF WLA ALTERNATIVES

WLA Alternatives	Q (mgd)	Effluent Concentration (mg/L) Org. N	NH3	NO2+ NO3	Org. P	Ortho-P	CBOD5	DO
MOONEY, DALE CITY 1 AND 8[1] (Neabsco Creek)								
1. Interim Control Decision Without Nitrification (TP = 0.18 mg/L)								
Mooney	20.0	0.0	20.0	0.0	0.02	0.16	10.0	6.0
Dale City 1 and 8	6.0	0.0	20.0	0.0	0.02	0.16	10.0	6.0
2. Interim Control Decision Without Nitrification with TP = 1.0 mg/L								
Mooney	20.0	0.0	20.0	0.0	0.10	0.90	10.0	6.0
Dale City 1 and 8	6.0	0.0	20.0	0.0	0.10	0.90	10.0	6.0

[1] With design Potomac Estuary boundary conditions, calibrated benthic flux rates and at existing discharge locations.

TABLE 10-2

NEABSCO CREEK
WATER QUALITY MODEL PROJECTIONS FOR WLA ALTERNATIVES

WLA Alternative	DO (mg/l) Daily Minimum	DO (mg/l) Min. Daily Avg.	CHLA (ug/l) Zone 1 Max. Daily Avg.	CHLA (ug/l) Zone 2 Max. Daily Avg.
1. Interim Control Decision Without Nitrification (TP=0.18 mg/L)	4.6(5)[1]	5.3(2)	75(10)	17(5)
2. Interim Control Decision Without Nitrification and TP=1.0 mg/L	4.6(5)	5.3(2)	76(10)	18(5)

[1]Numbers in parenthesis denote location of constituent concentration by model segment.

The maximum daily average chlorophyll-a concentrations in the downstream zone 1 are dominated by the Potomac main stem boundary condition of 80 ug/L. The different alternative phosphorus concentrations in the plant discharge do not have a significant impact on the chlorophyll-a concentrations in the downstream reaches. For an increase of total phosphorus from 0.18 mg/L to 1.0 mg/L, the maximum daily average chlorophyll-a of zone 1 increases from 75 ug/L to 76 ug/L. These values are below the 80 ug/L chlorophyll-a goal for zone 1. In the upstream zone 2, the increase in total phosphorus from alternative number 1 to alternative number 2 only increases the maximum daily average chlorophyll-a from 17 ug/L to 18 ug/L. These concentrations are below the 30 ug/L chlorophyll-a limit established for zone 2.

10.3 POLLUTANT FLUX TO THE POTOMAC MAIN STEM

The net fluxes of ammonia, BOD and total phosphorus from the embayment to the Potomac main stem are determined for the WLA alternatives. For each of the three constituents Table 10-3 presents the WWTP load, the net flux due to the WWTP and the percent of the WWTP load exported to the Potomac. For both alternatives about 90 percent of the WWTP ammonia load is exported to the Potomac main stem, and almost 50 percent of the WWTP CBOOU load is exported. For the two different total phosphorus loads (TP=0.18 mg/L for alternative number 1 and TP=1.0 mg/L for alternative number 2) the amount of the WWTP load exported to the Potomac main stem is about 45 percent.

10.4 SEASONAL NITRIFICATION

Under the summer design conditions, nitrification was not required for the Mooney and the two Dale City wastewater treatment plants to meet the State's dissolved oxygen standards for Neabsco Creek. Therefore, an evaluation of seasonal nitrification is not required.

TABLE 10-3

NEABSCO CREEK
POTOMAC MAIN STEM FLUX PROJECTIONS FOR WLA ALTERNATIVES

Constituent	WWTP Load (mg/L)	WWTP Load (kg/day)	Net Flux Due to WWTP (kg/day)	Percent of WWTP Load to Potomac
Ammonia-N (Without Nitrification)	19.2[1]	1,890	1,730	91
CBODU (CBOD5 = 10.0 MG/L)	26.2[1]	2,580	1,220	47
Total Phosphorus (0.18 mg/L)	0.18	18	8.4	47
Total Phosphorus (1.0 mg/L)	1.0	99	40.9	42

[1]WWTP load values reflect ammonia and BOD decay for Dale City WWTP's and thus are slightly less than the normal 20.0 mg/L for ammonia and 27.0 mg/L for CBODU

10.5 SEASONAL PHOSPHORUS REMOVAL

The potential for phosphorus accumulation within the embayments during months when stringent treatment standards are not imposed is evaluated for the Mooney and Dale City WWTPs. A specific methodology has been developed to consider winter accumulation and summer release of phosphorus from the benthos for the point source contribution only. The overall approach assumes that the WWTP phosphorus which settles out during the winter months is released back into the water column during the summer months at the same rate. Studies have shown that phosphorus can accumulate for several years and then can be released at a high rate during special conditions. To predict long term settling and periodic release is beyond the scope of this study. Therefore the daily accumulation of phosphorus is translated to a release rate which is applied to the low flow, high temperature, design conditions. The analysis is conducted using the calibrated model and does not consider extreme events such as anoxic conditions or very low pH which may release more phosphorus than under normal equilibrium conditions. The calibrated Neabsco Creek model has organic P and ortho-P settling rates but does not have calibrated benthic organic P nor ortho-P release rates.

The design condition for this analysis includes an average annual inflow rate for the headwater and incremental flows during the winter time simulation. For this simulation the dissolved oxygen of the upstream and Potomac Estuary boundaries is set at 9.2 mg/L, one mg/L less than saturation at the design temperature of 15 C. The winter time analysis does not include the simulation of algae.

In order to determine the effect of relaxing a more stringent total phosphorus allocation to a less stringent concentration in the winter months, two wasteload scenarios are selected for the analysis which includes a TP = 0.18 mg/L and a TP = 1.0 mg/L for the Interim Control Decision without nitrification. The following approach is conducted. First, the TP = 0.18 mg/L is considered a base line case. The effluent organic phosphorus and orthophosphorus load for the TP = 0.18 mg/L case is subtracted from the corresponding loads for the TP = 1.0 mg/L case to demonstrate the differential load between the two effluent cases. The total fluxes of the organic P and ortho-P to the Potomac Estuary are calculated for the two cases and the differences are computed to produce the differential load exported to the Potomac Estuary. Now, the difference of these differential loads (treatment plant effluent and flux) is the amount of phosphorus accumulated in the embayment from settling due to the treatment plant discharge of 1.0 mg/L where 0.18 mg/L is considered the base case.

For the Mooney and Dale City WWTPs, the incremental organic P and ortho-P are 8.1 kg/d and 72.7 kg/d, respectively. The incremental organic P and ortho-P fluxes to the Potomac are 3.6 kg/d and 38.0 kg/d, respectively. Therefore, the incremental phosphorus accumulation is 4.5 kg/d for organic P and 34.7 kg/d for ortho-P.

The organic P and ortho-P accumulation rates are then applied to the model during the summer time design condition as release rates. The benthic phosphorus release rates are distributed to reaches 2 through 11 in proportion to the SOD rates which are used to indicate the distribution of settled constituents from the treatment plant discharges.

Two cases are considered. For the first, the accumulated organic P and ortho-P are both released separately as $g/m^2/day$ in the model. The organic P release rate is 0.003 $g/m^2/day$, and the ortho-P release rate is 0.023 $g/m^2/day$. A maximum average daily chlorophyll-a concentration of 76 ug/L occurs in the downstream zone 1. In the upstream zone 2, 18 ug/L is predicted to occur during the summer with the additional benthic phosphorus releases.

For the second and more conservative case, the winter accumulated organic P and ortho-P are released as all ortho-P during the summer. The release rate is 0.026 $g/m^2/day$. The maximum daily average chlorophyll-a concentrations in zone 1 (76 ug/L) and zone 2 (18 ug/L) are the same as those for the first case. These maximum daily average chlorophyll-a concentrations with the additional phosphorus releases are only 1 ug/L greater than the chlorophyll-a concentration produced without the estimated increase.

10.7 RECOMMENDED WASTELOAD ALLOCATION

Rationale for a WQ-based Weekly Avg Max limit Apr-Oct

The State's dissolved oxygen standards are not predicted to be violated for a CBOD5 of 10.0 mg/l and an ammonia concentration of 20.0 mg/L. Therefore the Interim Control Decision with a CBOD5 of 10.0 mg/L and without nitrification is recommended. A total phosphorus effluent concentration of 1.0 mg/L is not predicted to violate the chlorophyll-a goal of 80 ug/L in Zone 1 and 30 ug/L in Zone 2.

In order to meet the State's dissolved oxygen standard and the embayment's chlorophyll-a management goals, the recommended effluent limits for a 20 mgd discharge for the H.L. Mooney WWTP, a 4 mgd discharge for the Dale City plant #1 and a 2 mgd discharge for the Dale City plant #8 are as follows:

Constituent	Effluent Limit
Dissolved Oxygen (DO)	6.0 mg/L year-round
5-day Carbonaceous Biochemical Oxygen Demand (CBOD5)	10.0 mg/L year-round
Total Kjeldahl Nitrogen (TKN)	No nitrification required
Total Phosphorus (TP)	1.0 mg/L*

Within the embayment, the chlorophyll-a goals are not predicted to be violated for an effluent total phosphorus concentration of 1.0 mg/L. To protect the main stem of the Potomac Estuary, an interim total phosphorus limit of 0.18 mg/L is regionally accepted as presented in the Interim Control Policy of the 1986 208 Plan Supplement (Wash. COG, 1986). Therefore, at the present time, the more restrictive limit on total phosphorus is the 0.18 mg/L for protection of the main stem Potomac. As indicated in the 208 Plan Supplement, future long-term Potomac Studies being mutually undertaken by COG, the states and EPA will better define the total phosphorus limits required for Potomac main stem protection.

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*The effluent limit is based on the simulation of the low-flow, high-temperature design conditions. Future studies that evaluate effluent constraints for the main stem of the Potomac will consider the feasibility of seasonal phosphorus removal standards.

5/8/2014 7:31:47 AM

Facility = HL Mooney
Chemical = Ammonia (Nov-January)
Chronic averaging period = 30
WLAa = 31.62
WLAc = 11.05
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

9

5/8/2014 7:34:01 AM

Facility = HL Mooney
Chemical = Ammonia (February-March)
Chronic averaging period = 30
WLAa = 13.5
WLAc = 4.51
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 9.09969212130756
Average Weekly limit = 5.42801263050433
Average Monthly LImit = 4.51

The data are:

9

5/8/2014 7:57:31 AM

Facility = HL Mooney
Chemical = Ammonia (Feb - March) using MSTRANTI from 2009
Chronic averaging period = 30
WLAa = 13.357
WLAc = 4.332
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Note: MSTRANTI WLAs are only 2 significant figures so the Facility's WLAs (calculated with the dilution factor) are lower.

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 8.74054684467946
Average Weekly limit = 5.21378064641791
Average Monthly LImit = 4.332

The data are:

9

7/2/2014 12:44:44 PM

Facility = HL Mooney
Chemical = Ammonia as N (Apr-Oct)
Chronic averaging period = 30
WLAa = 7.74
WLAc = 3.42
Q.L. = .2
# samples/mo. = 30
# samples/wk. = 8

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 6.90043171948378
Average Weekly limit = 4.11614261559309
Average Monthly LImit = 3.42

The data are:

9

5/1/2014 10:07:42 AM

Facility = H.L. Mooney
Chemical = Toxicity - P. promelas
Chronic averaging period = 4
WLAa = 6
WLAc = 2.39
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 12
Expected Value = 1
Variance = 0
C.V. = 0
97th percentile daily values = 1
97th percentile 4 day average = 1
97th percentile 30 day average= 1
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

1
1
1
1
1
1
1
1
1
1
1
1

5/1/2014 10:06:57 AM

Facility = H.L. Mooney
Chemical = Toxicity - C. dubia
Chronic averaging period = 4
WLAa = 6
WLAc = 2.39
Q.L. = 1
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 12
Expected Value = 1
Variance = 0
C.V. = 0
97th percentile daily values = 1
97th percentile 4 day average = 1
97th percentile 30 day average= 1
< Q.L. = 0
Model used = lognormal

No Limit is required for this material

The data are:

1
1
1
1
1
1
1
1
1
1
1
1

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY
Northern Regional Office

13901 Crown Court **Woodbridge, VA 22193** **(703) 583-3800**

SUBJECT: TOXICS MANAGEMENT PROGRAM (TMP) DATA REVIEW
H.L. Mooney Wastewater Treatment Works (VA0025101)
REVIEWER: Douglas Frasier
DATE: 12 November 2013

PREVIOUS REVIEW: 12 October 2012

DATA REVIEWED:

This review covers the second (2nd) annual acute and chronic toxicity tests conducted in August 2013 at Outfall 001.

DISCUSSION:

The results of these toxicity tests, along with the results of previous toxicity tests conducted since 1998 on effluent samples collected from Outfall 001, are summarized in Table 1.

The acute toxicity of the effluent sample was determined with a static 48-hour acute toxicity test using *C. dubia* and *P. promelas* as the test species. The acute test yielded for both species a No Observed Adverse Effect Concentration (NOAEC) of 100% effluent; thus passing the acute toxicity criterion.

The chronic toxicity of the effluent samples was determined with a static daily renewal 3-brood survival and reproduction test using *C. dubia* and a static daily renewal 7-day survival and growth test using *P. promelas*. Both toxicity tests yielded a No Observed Effect Concentration (NOEC) of 100% effluent; passing the chronic toxicity criteria.

CONCLUSIONS:

The acute and chronic toxicity tests are valid and the results are acceptable. The test results indicate that the effluent samples exhibit no acute or chronic toxicity for the test species.

BIOMONITORING RESULTS
H.L. Mooney Wastewater Treatment Works (VA0025101)

Table 1
Summary of Toxicity Test Results for Outfall 001

TEST DATE	TEST TYPE/ORGANISM	48-h LC_{50} (%)	IC_{25} (%)	NOAEC /NOEC (%)	% SURV	TU_a	TU_c	REMARKS
6/25/98	Acute *C. dubia*	**66.6**			5			1st quarterly
6/25/98	Acute *P. promelas*	>100			100			
6/23/98	Chronic *C. dubia*			**10 SR**	0			
6/23/98	Chronic *P. promelas*			100 SG	90			
11/5/98	Acute *C. dubia*	>100			100			2nd quarterly
11/5/98	Acute *P. promelas*	>100			100			
11/3/98	Chronic *C. dubia*			100 SR	100			
11/3/98	Chronic *P. promelas*			100 SG	100			
3/23/99	Acute *C. dubia*	>100			100			3rd quarterly
3/23/99	Acute *P. promelas*	>100			100			
3/20/99	Chronic *C. dubia*			100 SR	100			
3/20/99	Chronic *P. promelas*			100 SG	100			
6/29/99	Acute *C. dubia*	>100			100			4th quarterly
6/29/99	Acute *P. promelas*	>100			95			
6/24/99	Chronic *C. dubia*			100 SR	100			
6/24/99	Chronic *P. promelas*			100 SG	95			
11/9/99	Acute *C. dubia*	>100			100			1st annual
11/4/99	Chronic *C. dubia*			**Invalid**				30% mortality in control group
11/18/99	Chronic *C. dubia*			100 SR	100			Retest
10/31/00	Acute *C. dubia*	>100			100			2nd annual
10/31/00	Acute *P. promelas*	>100			100			
10/26/00	Chronic *C. dubia*			100 SR	90			
10/26/00	Chronic *P. promelas*			100 SG	98			
08/28/01	Acute *C. dubia*	**85.5**			40			3rd annual
08/28/01	Acute *P. promelas*	>100			100			
08/23/01	Chronic *C. dubia*	>100	77.8	100 S 39.17 R	90			
08/23/01	Chronic *P. promelas*	>100	>100	100 SG	98			
10/16/01	Acute *C. dubia*	>100			100			Retest
10/16/01	Acute *P. promelas*	>100			100			
10/13/01	Chronic *C. dubia*	>100	>100	100 SR	100			
10/11/01	Chronic *P. promelas*	>100	>100	100 SG	100			3 minnows lost in test
08/27/02	Acute *C. dubia*	>100			100			4th annual
08/27/02	Acute *P. promelas*	>100			95			

TEST DATE	TEST TYPE/ORGANISM	48-h LC_{50} (%)	IC_{25} (%)	NOAEC /NOEC (%)	% SURV	TU_a	TU_c	REMARKS
08/22/02	Chronic *C. dubia*	>100	>100	100 SR	50			Control survival 80%
08/22/02	Chronic *P. promelas*	>100	>100	100 SG	88			
07/24/03	Acute *C. dubia*	>100			100			5th annual
07/24/03	Acute *P. promelas*	>100			100			
07/22/03	Chronic *C. dubia*	>100	>100	100 SR	90			
07/22/03	Chronic *P. promelas*	>100	>100	100 SG	100			
Permit Reissued October 15, 2003								
11/20/03	Acute *C. dubia*	>100		100	85	1		1st annual
11/20/03	Acute *P. promelas*	>100		100	100	1		
11/18/03	Chronic *C. dubia*	>100	>100	100 SR	100		1	
11/18/03	Chronic *P. promelas*	>100	>100	100 SG	100		1	
04/14/05	Acute *C. dubia*	>100		100	100	1		2nd annual
04/14/05	Acute *P. promelas*	>100		100	100	1		
04/12/05	Chronic *C. dubia*	>100	>100	100 SR	100		1	
04/12/05	Chronic *P. promelas*	>100	58	1 SG	68		100	
06/21/05	Acute *P. promelas*	>100		100	100	1		3rd annual
06/21/05	Acute *P. promelas*	>100		100	100	1		
06/16/05	Chronic *C. dubia*	>100	>100	100 SR	100		1	
06/16/05	Chronic *P. promelas*	>100	>100	100 SG	100		1	
06/13/06	Acute *C. dubia*	>100		100	100	1		
06/13/06	Acute *P. promelas*	>100		100	100	1		
06/08/06	Acute *C. dubia*							INVALID
06/08/06	Chronic *P. promelas*	>100	>100	100 SG	100		1	
08/16/07	Acute *C. dubia*	>100		100	100	1		4th annual
08/16/07	Acute *P. promelas*	>100		100	100	1		
08/14/07	Chronic *C. dubia*	>100	>100	100 SR	100		1	
08/14/07	Chronic *P. promelas*	>100	>100	100 SG	100		1	
02/14/08	Acute *C. dubia*	>100		100	100	1		
02/14/08	Acute *P. promelas*	>100		100	100	1		
02/12/08	Chronic *C. dubia*	>100	>100	100 SR	100		1	
02/12/08	Chronic *P. promelas*	>100	>100	100 SG	98		1	
08/07/08	Acute *C. dubia*	>100		100	100	1		5th annual
08/07/08	Acute *P. promelas*	>100		100	100	1		
08/05/08	Chronic *C. dubia*	>100	>100	100 SR	100		1	80% survival for control
08/05/08	Chronic *P. promelas*	>100	>100	100 SG	93		1	
Permit Reissued 1 July 2009								
09/24/09	Acute *C. dubia*	>100		100	95	1		1st annual
09/24/09	Acute *P. promelas*	>100		100	100	1		

TEST DATE	TEST TYPE/ORGANISM	48-h LC_{50} (%)	IC_{25} (%)	NOAEC /NOEC (%)	% SURV	TU_a	TU_c	REMARKS
09/22/09	Chronic *C. dubia*	>100	>100	100 S **10 R**	100		10	
09/22/09	Chronic *P. promelas*	>100	>100	100 SG	98		1	
CTO Issued for the 24 MGD Plant 8 November 2010								
11/02/10	Acute *C. dubia*	>100		100	100	1		1st quarter
11/02/10	Acute *P. promelas*	>100		100	100	1		
10/28/10	Chronic *C. dubia*	>100	>100	100 SR	100		1	
10/28/10	Chronic *P. promelas*	>100	>100	100 SG	100		1	
04/19/11	Acute *C. dubia*	>100		100	100	1		2nd quarter
04/28/11	Acute *P. promelas*	>100		100	100	1		
04/14/11	Chronic *C. dubia*	>100	>100	100 SR	100		1	
04/14/11	Chronic *P. promelas*	>100	>100	100 SG	98		1	
06/23/11	Acute *C. dubia*	>100		100	100	1		3rd quarter
06/23/11	Acute *P. promelas*	>100		100	100	1		
06/21/11	Chronic *C. dubia*	>100	>100	100 SR	100		1	
06/21/11	Chronic *P. promelas*	>100	>100	100 SG	98		1	
12/08/11	Acute *C. dubia*	>100		100	95	1		4th quarter
12/08/11	Acute *P. promelas*	>100		100	100	1		
12/06/11	Chronic *C. dubia*	>100	>100	100 SR	100		1	
12/06/11	Chronic *P. promelas*	>100	>100	100 SG	100		1	
08/02/12	Acute *C. dubia*	>100		100	100	1		1st annual
08/02/12	Acute *P. promelas*	>100		100	100	1		
07/31/12	Chronic *C. dubia*	>100	>100	100 SR	100		1	
07/31/12	Chronic *P. promelas*	>100	>100	100 SG	98		1	
08/22/13	Acute *C. dubia*	>100		100	90	1		2nd annual
08/22/13	Acute *P. promelas*	>100		100	100	1		
08/20/13	Chronic *C. dubia*	>100	>100	100 SR	100		1	
08/20/13	Chronic *P. promelas*	>100	>100	100 SG	95		1	

FOOTNOTES:

A **bold** faced value for LC_{50} or NOEC indicates that the test failed the criteria.

ABBREVIATIONS:

S - Survival; R - Reproduction; G - Growth
% SURV – Percent survival in 100% effluent
EA - EA Engineering, Science, and Technology, Inc.

Attachment 16

Jan-Dec 2012		January-12	February-12	March-12	April-12	May-12	June-12	July-12
As	Arsenic	28.2	29.1	24.7	<10.0	27.7	30.7	<4.00
Be	Beryllium	0.61	0.65	0.38	0.53	<0.20	<0.20	0.29
Cd	Cadmium	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Cr	Chromium	21.7	25.3	21.4	28.1	20.1	24.2	21.4
Cu	Copper	108	111	83.9	165	144	158	145
Pb	Lead	16.6	11.6	9.50	12.1	8.80	7.48	9.15
Hg	Mercury	0.23	0.27	0.20	0.15	0.40	0.41	0.28
Mo	Molybdenum	<4.0	7.01	<4.00	5.42	4.88	5.41	4.10
Ni	Nickel	6.12	5.66	4.93	5.90	5.78	6.43	6.36
Se	Selenium	<4.0	19.0	<4.0	<4.0	<4.0	<4.0	<4.00
Zn	Zinc	315	324	251	345	356	394	373
Fe	Iron							
V*								
%TS	Total Solids						27.70%	28.10%

		August-12	September-12	October-12	Nov 2012	Dec 12
As	Arsenic					
Be	Beryllium					
Cd	Cadmium	<20.0	19.4	<11.0	<11.0	14
Cr	Chromium	<0.400	0.262	<0.20	<0.20	<0.40
Cu	Copper	<2.0	<2.0	<1.9	2.3	2.4
Pb	Lead	13.5	15.1	14	15	21
Hg	Mercury	112	156	127	121	124
Mo	Molybdenum	<20.0	11.9	17	21	23
Ni	Nickel	<0.0250	0.222	0.69	0.31	0.40
Se	Selenium	4.16	5.38	7	9	17
Zn	Zinc	5.56	7.04	8	9	8
Fe	Iron	<20.0	<10.0*	4.4	4.4	5.7
V*	Vanadium	339	434	422	385	401
Fe	Iron			27200	27000	30200
%TS	Total Solids	24.80%	28.40%	26.40%	26.60%	27.00%

** All units are mg/kg

* Sample reanalyzed by HRSD Result= 4.3

Sludge Cake Analyis 2013

		January	February	March	April	May	June	July	August	Sept
Collection Date:		01/07/13	02/06/13	03/11/13	04/09/13	05/07/13	06/07/13	07/11/13	08/01/13	09/04/13
As	Arsenic	<12	<12	<11	<11	<12	<11	4.0	3.0	4.0
Be	Beryllium	0.311	0.277	0.266	<0.200	<0.200	0.703	<0.2000	<0.2000	<0.2000
Cd	Cadmium	<1.9	2.4	2.2	1.8	<2.0	<1.8	<2.0	<2.0	<2.0
Cr	Chromium	20	23	26	22	22	32	35	36	40
Cu	Copper	100	109	88	93	96	166	159	137	171
Pb	Lead	19	26	28	21.0	15	19	15	13	14
Hg	Mercury	0.32	0.24	0.17	0.23	0.23	0.49	0.40	0.5	0.5
Mo	Molybdenum	13	15	14	11	14	17	<5	<5	<5
Ni	Nickel	6	7	7	5	6	8	8	8	10
Se	Selenium	5.5	5.6	3.5	4.6	4.9	3.2	<5.0	<5.0	5.0
Zn	Zinc	370	375	361	330	344	459	546	532	526
Fe	Iron	29300	30100	32700	25700	26600	32500	38800	++++	++++
V*	Vanadium	-----	7.66	8.40	9.10	7.12	8.86	8.91	9.10	5.34
	Total Solids	26.80%	24.70%	26.70%	27.30%	24.80%	28.1%	27.00%	25.25%	26.90%

*** Began analyzing monthly 2/13 at Analytics Corporation**

**** All units are mg/kg**

***** Beryllium analyzed at Analytics Corporation**

****** All other metals analyzed at HRSD**

Nickel reanalyzed by HRSD. Originally reported 121 mg/kg

++++ Analyzed Iron per request of Steve Bennet, ceased analysis 8/13

Beginning in July 2013 All metals with the exception of Be and V were analyed at A&L Laboratories

Public Notice – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Prince William, Virginia.

PUBLIC COMMENT PERIOD: August 20, 2014 to September 19, 2014

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board

APPLICANT NAME, ADDRESS AND PERMIT NUMBER: Prince William County Service Authority, PO Box 2266, Woodbridge, VA 22195, VA0025101

NAME AND ADDRESS OF FACILITY: HL Mooney Advanced Water Reclamation Facility, 1851 Rippon Blvd, Woodbridge, VA 22191

PROJECT DESCRIPTION: Prince William County Service Authority has applied for a reissuance of a permit for the public HL Mooney Advanced Water Reclamation Facility. The applicant proposes to release treated sewage wastewaters from residential and commercial areas at a rate of 24 million gallons per day into a water body. The sludge will be disposed by one of the following methods: incineration, disposal at an approved landfill, land application by an approved contractor, or composting at a permitted facility. The facility proposes to release the treated sewage in the Neabsco Creek in Prince William County in the Potomac watershed. A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: pH, cBOD, Total Suspended Solids, Total Nitrogen, *E. coli*, Ammonia as N, Dissolved Oxygen, and Total Phosphorus, The facility shall also monitor without limitation the following parameters: Total Kjeldahl Nitrogen, Nitrate+Nitrite, and Whole Effluent Toxicity.

This facility is subject to the requirements of 9VAC25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by hand-delivery, e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION: The public may review the draft permit and application at the DEQ-Northern Regional Office by appointment, or may request electronic copies of the draft permit and fact sheet.
Name: Alison Thompson
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3834   E-mail: Alison.Thompson@deq.virginia.gov   Fax: (703) 583-3821